

ADDENDUM NO. 2
TO
PLANS AND SPECIFICATIONS
FOR
PA‘AUILO SLAUGHTERHOUSE IMPROVEMENTS
JOB NO. B-4134
AT
PA‘AUILO, HĀMĀKUA, HAWAI‘I
COUNTY AND STATE OF HAWAI‘I

NOTICE TO ALL PROSPECTIVE BIDDERS

The items listed below are made a part of the contract and shall govern the work, taking precedence over the previously issued plans and specifications governing the particular item of work mentioned.

NOTICE TO BIDDERS

Bid Opening: The bid opening date is postponed from June 7, 2012 to June 14, 2012 at 2:00 p.m. Bids received after the time fixed for opening will not be considered.

PROPOSAL

Delete PROPOSAL in entirety and replace with attached revised PROPOSAL. Alternate (Deductive) Nos. 5 and 6 included. (13 pages attached).

REQUEST FOR CLARIFICATION

Item No. 1: Reference Section 08330/Overhead Coiling Doors: Paragraph 2.2.A.1 calls out the door sizes, Door 10B – 10’x10’ and Door 10C – 18’x10’. The Door Schedule on Sheet A3.8.1 indicates: Door 10B – 12’x10’ and Door 10C – 20’x10’. Please clarify the size of the overhead coiling service doors.

Response: Door 10B shall be a 10’-0” x 10’-0” door. Door 10C shall be a 18’-0” x 10’-0” door.

Item No. 2: Sheet C-1, General Construction Notes 5, 11 and 12: These notes make reference to the University and Hospital. Please reword these notes and confirm that the University and Hospital have no jurisdiction over the Slaughterhouse Improvements.

Response: See SKC-1, 1 page attached.

Item No. 3: Sheet C-2, Note 2 of Detail 5: This note states “This trench section applies to piping within private properties only.” Can this section be applied to the property associated with the Slaughterhouse?

Response: See SKC-2, 1 page attached.

Item No. 4: Specification Section 133419/METAL BUILDING SYSTEMS, Para. 1.04 A., 3., indicates Collateral Load of 5 psf. Plan sheet S0.1 Structural General Notes 11.C indicates 1. Finish @ Roof = 9 PSF and 2. Mechanical & Electrical @ Roof = 3 PSF. Please confirm 3 PSF is satisfactory.

Response: 3 PSF is acceptable.

Item No. 5: Specification Section 133419/METAL BUILDING SYSTEMS, Para. 1.04 A., 4., indicates 105 mph wind load. Plan sheet S0.1 Structural General Notes 11.D includes Effective Wind Speed / Kzt of 120 mph / 1.3. Please confirm the Effective Wind Speed / Kzt is also considered in the Wind Load.

Response: Confirmed; the topography factor of 1.3 as required by 2006 International Building Code is applied to basic wind speed.

Item No. 6: Specification Section 133419/METAL BUILDING SYSTEMS, Para. 1.04 B., 1., indicates Seismic Use Group II, Site Class B, Seismic Design Category D with $S_d=1.00$ and $S_{d1}=0.40$ ($S_s=150$, $S_1=60$). Plan sheet S0.1 Structural General Notes 11.E indicates Seismic Group I, Site Class D, $S_s=1.25g$ and $S_1=0.50g$. Please confirm we are to design building based on Structural General Notes 11. A-E, and disregard information in spec section 1.04B. 1.

Response: See specification section 133419/ METAL BUILDING SYSTEMS, revised and reissued herein this Addendum (14 pages).

Item No. 7: Specification Section 133419/METAL BUILDING SYSTEMS, Para. 1.04 G., indicates lateral deflection of $H/200$. MBMA manual standard deflection for low rise metal buildings is $H/60$. There are no walls or other structural attached or support by the Hide Storage Bldg. Please confirm the use of standard deflection of $H/60$ in lieu of $H/200$.

Response: The use of standard deflection of $H/60$ in lieu of $H/200$ is acceptable.

Item No. 8: Specification Section 133419/METAL BUILDING SYSTEMS, Para. 1.11, A. requires a 10 year manufacturer's material warranty. Major manufacturers provide a 1 year warranty on primary and secondary frame materials and selected 10 year warranties on metal roof panels. Please confirm the 10 year manufacturers' warranty will apply only to metal roof panels if supplied by building manufacturer.

Response: See specification section 133419/ METAL BUILDING SYSTEMS, revised and reissued herein this Addendum (14 pages).

Item No. 9: Specification Section 133419/METAL BUILDING SYSTEMS, Para. 1.11, B. requires building manufacturers' workmanship warranty for 5 years and includes warranty against leaks from roof, siding and flashing. Section 2.05 Metal Roof Panels and Section 2.06 Sheet Metal Flashing and Trims, both refer to Division 7 for standards and requirements. Major manufacturers provide a standard 1 year warranty on workmanship for primary and secondary frames only. Please confirm manufacturers' workmanship warranty shall be 1 year and 5 year workmanship warranty against leaking from roof, siding and flashing shall be as specified in Division 7.

Response: See specification section 133419/METAL BUILDING SYSTEMS, revised and reissued herein this Addendum (14 pages) and specification section 074100/PREFORMED METAL ROOFING, issued herein this Addendum (6 pages).

Item No. 10: Specification Section 133419/METAL BUILDING SYSTEMS, Para. 2.02, J. indicates High-Strength bolts per ASTM A325, Type 1, and ASTM F 1852. Please confirm bidders are allowed to use either type.

Response: Confirmed; bidders are allowed to use either type of high-strength bolt.

Item No. 11: Specification Section 133419/METAL BUILDING SYSTEMS, Para. 2.04, D 1. Purlins and D 2. Girts indicate Depth at 8". Please confirm manufacturers are allowed to increase the depth to meet or exceed design loads.

Response: Confirmed; manufacturers are allowed to increase the depth of girts to meet or exceed design loads.

Item No. 12: Please confirm Specification Section 133419/METAL BUILDING SYSTEMS, Para. 3.02 Accessory Installation should be deleted and we are to follow standards and requirements as indicated in Division 7.

Response: See specification section 133419/METAL BUILDING SYSTEMS, revised and reissued herein this Addendum (14 pages).

Item No. 13: Did you reversed the tapered frames to the outside for aesthetics or was it to assure you cleared the top of the concrete wall? I did a quick design and the column taper is less than 6". We could also provide straight columns at 12" deep. In either case the base plate is 8" wide by 13" long. Structural notes maximum base plate at 12".

Response: Maximum column depth, straight or tapered, shall be 12-inches. Maximum base plate, depth and width, shall be 13-inches.

Item No. 14: Please confirm that the Surety will not be held liable beyond two years for the following Specification Sections:

- Section 76200-2 (Roof Flashing)
- Section 87100-4 (Door Hardware)
- Section 221500-5 (Air Compressor)
- Section 238126-8 (Cooling Coil & Refrigeration System)
- Section 238126-9 (Condenser)
- Section 265100-3 (Ballasts)

Response: It is confirmed that the Surety will not be held liable beyond two years for the aforementioned Specification Sections:

CHANGES TO TECHICIAL SPECIFICATION

Item No. 1: Section 01230 – ALTERNATES

Delete Section 01230 in entirety and insert revised specification section 01230 to add Deductive Alternate No. 1 and Deductive Alternate No. 2, 2 pages attached.

Item No. 2: Section 074100 - PREFORMED METAL ROOFING

Add specification section 074100, 6 pages attached.

Item No. 3: Section 074113 – STANDING SEAM METAL ROOF PANELS

Delete specification section 074113 in entirety.

Item No. 4: Section 133419 – METAL BUILDING SYSTEMS

Delete Section 133419 in entirety and insert revised specification section 133419, 14 pages attached.

Item No. 5: Section 238126 – HVAC SYSTEMS

Delete Section 238126 in entirety and insert revised specification section 238126, 19 pages attached.

Item No. 6: Section 335613 – FUEL STORAGE AND PIPING SYSTEM

Delete Section 335613 in entirety and insert revised specification section 335613, 16 pages attached.

CHANGES TO DRAWINGS

Item No. 1: Sheet C-1, General Construction Notes

Revisions to Sheet C-1, General Construction Notes shown on SKC-1, dated May 23, 2012; 1 page attached.

Item No. 2: Sheet C-2, Detail 5

Removed information from Detail 5 as shown on SKC-2, dated May 23, 2012; 1 page attached.

Item No. 3: Sheets C-4, Detail PARTIAL SITE PLAN 1 (ADDITIVE ALTERNATE #3)

Revisions to Sheet C-4, Detail PARTIAL SITE PLAN 1 (ADDITIVE ALTERNATE #3) shown on SKC-3, dated May 23, 2012; 1 page attached.

Item No. 4: Sheet S1.1, Detail 1/SLAB-ON-GRADE DETAIL

Note reading “3” FOR 6” SLAB” shall be revised to read “3” FOR 6” AND 14” SLABS”.

Item No. 5: Sheet S4.1, Detail A/FOUNDATION PLAN

Trench Drain shall have 1.04% built-in slope, maximum invert of 12”, and minimum invert of 9”.

Item No. 6: Sheet S4.1/HIDE STORAGE FOUNDATION PLAN

General Note #1 for the Sheet to read *“Treat all cold joints shown on S4.1 with Crack Control Joint sealant shown in Detail 4/S1.1”*

Item No. 7: Sheet M1.0/AIR CURTAIN SCHEDULE

General Note #1 for the Sheet to read *“Treat all cold joints shown on S4.1 with Crack Control Joint sealant shown in Detail 4/S1.1”*

Revisions to Sheet M1.0, AIR CURTAIN SCHEDULE shown on SKM-1, dated May 23, 2012;
1 page attached.

Item No. 8: Sheet E0.0/FIXTURE SCHEDULE

Revisions to Sheet E0.0, FIXTURE SCHEDULE shown on SKE-1, dated May 23, 2012;
1 page attached.

Item No. 9: Sheet E3.0/ELECTRICAL POWER PLAN - NEW

Revisions to Sheet E3.0, ELECTRICAL POWER PLAN - NEW shown on SKE-2, dated May 23, 2012; 1 page attached.

Item No. 10: Sheet E4.0/ELECTRICAL LIGHTING PLAN - NEW

Revisions to Sheet E4.0, ELECTRICAL LIGHTING PLAN - NEW shown on SKE-3, dated May 23, 2012; 1 page attached.

Item No. 11: Sheet E6.0/ELECTRICAL PANEL SCHEDULES – PANEL G

Revisions to Sheet E6.0, ELECTRICAL PANEL SCHEDULES – PANEL G shown on SKE-4, dated May 23, 2012; 1 page attached.

REQUEST FOR SUBSTITUTION

Item No. 1: Sheet E0.0 – FIXTURE SCHEDULE, Pre-Qualified Substitution

The following items hereinafter listed are approved as equal to the previously specified items, provided all requirements of the contract documents are met.

| <u>ITEMS</u> | <u>SPECIFIED BRAND</u> | <u>SUBSTITUTE BRAND</u> |
|----------------|----------------------------|---|
| Fixture Type A | Lithonia #EFS32MVOLTGE10IS | H E Williams #92-4-332-A-WTT/2-EB3-UNV |
| Fixture Type B | Lithonia #VR2C35S277IRLPI | Luminaire #LVP58-50MH-277-HPF-CP-BRZ (50 watt in lieu of 35 watt) |

| | | |
|----------------|----------------------------|-------------------------|
| Fixture Type C | Lithonia #LRDOC12MEDYEL120 | Hubbell #DOK-12LU-6K-SP |
| Fixture Type D | Lithonia #TWH35LTBCWILPI | Kim #WD18D3/35WLPS/DB |
| Fixture Type E | Lithonia #LQMSW3G120/277 | Dual-Lite #LXUGWE |



Warren H. W. Lee, P.E., Director
Department of Public Works
County of Hawai'i

Date Issued: June 4, 2012

Please detach and execute receipt below. Return immediately via facsimile (808) 961-8630 or mail to the Administration Office, Department of Public Works, County of Hawai'i at Aupuni Center, 101 Pauahi Street, Suite 7, Hilo, Hawaii 96720-4224

Receipt of Addendum No. 2 via website for Pa'auilo Slaughterhouse Improvements, Job No. B-4134, Pā'āuilo, Hāmākua, Hawai'i, is hereby acknowledged.

Signed: _____ Title: _____

Firm: _____ Date: _____

PROPOSAL
FOR
PA‘AUILO SLAUGHTERHOUSE IMPROVEMENTS
PA‘AUILO, HĀMĀKUA, HAWAI‘I
COUNTY AND STATE OF HAWAI‘I
JOB NO. B-4134

The Honorable William P. Kenoi, Mayor
County of Hawai‘i
Hilo, Hawai‘i

Sir:

The undersigned Bidder hereby proposes to furnish and pay for all materials, tools, transportation, equipment, labor and other incidental work necessary to construct and complete in place the “PA‘AUILO SLAUGHTERHOUSE IMPROVEMENTS,” Job No. B-4134, Pa‘auilo, Hāmākua, Hawai‘i, together with equipment and all necessary appurtenances and work incidental thereto in accordance with the true intent and meaning of the plans, Notice to Bidders, Proposal, Wage Rate Schedule, General Specifications, and Detail Specifications, made a part of these specifications; and Standard Specifications for Public Works Construction (September, 1986) and General Requirements and Covenants (July, 1972), made a part of these specifications by reference; and any other form of pertinent proposed contract documents which have been attached herein and hereby made a part of the project specifications and contract documents, which are on file in the Administration Office, Department of Public Works, City of Hilo, County and State of Hawai‘i, for the Total Lump Sum Basic Bid of: _____
_____ DOLLARS (\$_____).

It is understood that the award of the contract shall be based on the lowest Basic Bid or combination of Basic Bid and any, all or none of the Alternate(s) as determined by the Director to be in the best interest of the County of Hawai‘i. The undersigned acknowledges and agrees that it is the

Director's sole discretion to incorporate or not incorporate any, all or none of the Alternate(s) into the scope of work

The undersigned agrees to complete the same within one hundred twenty (120) consecutive working days from and including the date of commencement as specified in a written order by the Director, Department of Public Works, County of Hawai'i.

In order that the Contractor may be awarded within the available funds, each Bidder must and is required to complete this proposal with the following alternate bids.

Alternate No. 1 (Additive): Doors O9A and O9B, Remove, repair and install CMU lintel, door frame, door, hardware, and incidentals in place complete. Add the sum of: _____ Dollars (\$_____).

Alternate No. 2 (Additive): Hide Storage Building, site work, electrical, plumbing, and incidentals in place complete. Add forty (40) consecutive working days and the sum of: _____ Dollars (\$_____).

Alternate No. 3 (Additive): 1,000 gallon off-road diesel fuel tank, 1,000 gallon on-road diesel fuel tank, site work, dispensing systems, and incidentals in place complete. Add the sum of: _____ Dollars (\$_____).

Alternate No. 4 (Additive): ACCU-4, E-4a, E-4B refrigerant/drain piping and incidentals in place complete. Add the sum of: _____ Dollars (\$_____).

Alternate No. 5 (Deductive): Equipment - Vacuum Packaging Machine (Ref. 111300-2.14), Dicer (Ref. 111300-2.15), and Mixing Grinder (Ref. 111300-2.16). Delete the sum of: _____ Dollars (\$_____).

Alternate No. 6 (Deductive): Equipment - Beef Paunch Truck (Ref. 111300-2.12), Beef Brisket Saw (Ref. 111300-2.13), Beef Hock Cutter (Ref. 111300-2.17). Delete the sum of: _____ Dollars (\$_____).

It is understood and agreed that the liquidated damages shall be as set forth in the General Requirements and Covenants of the County of Hawai'i (July, 1972) as amended by the Special Provisions and determined for this Project to be the sum of FOUR HUNDRED DOLLARS (\$400.00) per consecutive working day.

It is also understood and agreed that the Director reserves the right to accept or reject any and all bids and to waive any and all defects and informalities, when in his opinion such rejection or waiver will be for the best interest of the County of Hawai'i.

It is also understood and agreed that the award of the contract hereunder shall be conditioned upon the Director having the right to hold all bids for a period of sixty (60) consecutive calendar days from the opening hereunder unless otherwise required by law, during which time no bid may be withdrawn.

The Bidder hereby agrees that if it is awarded this contract, it will enter into and execute the same within ten (10) days from the date of notice to award and furnish a bond in the amount and character required within the time specified by the specifications, pursuant to Section 103D-324, Hawai'i Revised Statutes.

The Bidder represents that it () has, () has not, participated in a previous contract or subcontract subject to the Equal Employment Opportunity Clause of Executive Order 11246 of September 24, 1965, as amended October 31, 1967; that it () has, () has not, filed all required compliance reports; that it () has, () has not, an affirmative action program on equal employment opportunity; that he/she will, if required, furnish a written Affirmative Action Program; and that REPRESENTATIONS including submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to the contract awards.

The Bidder further represents that it will, if required, submit and require proposed subcontractors to submit a compliance report prior to the award of the contract or subcontract and a written Affirmative Action Program, if required, within a specified time after award.

The Bidder further agrees that if awarded the contract and if it FAILS to enter into and execute the contract and furnish the required bond within the specified time, the county may determine the bidder has abandoned the contract and thereupon forfeiture of the security accompanying his/her proposal shall operate and the same become property of the County of Hawai'i.

The Bidder further understands and agrees that by submitting this proposal, 1) it is declaring its proposal is not in violation of Chapter 84, Hawai'i Revised Statutes, concerning prohibited State contracts, and 2) it is certifying that the price(s) submitted was/were independently arrived at without collusion.

Substitution of Retainage. Pursuant to Section 103-32.2, Hawai'i Revised Statutes, the contracting officer may enter into agreement with the Contractor which will allow the Contractor to withdraw from time to time the whole or any portion of the sum retained under Section 103-32.1 upon depositing with the contracting officer any general obligation bond of the State of Hawai'i or counties of Hawai'i, Maui, Kauai or City and County of Honolulu with a market value of not less than the sum to be withdrawn. A certificate of market value from a bank or trust company or stock brokerage firm must be submitted with the bond. If registered bonds are used, they must be assigned irrevocably to the County of Hawai'i.

Enclosed herewith is:

- | | |
|----------|--|
| CROSS 1. | Legal Tender |
| OUT | 2. Certificate of Deposit |
| THREE | 3. Certified Check |
| | 4. Surety Bond according to Section 103D-323, Hawai'i Revised Statutes and Chapter 3-122, Subchapter 24, Hawai'i Administrative Rules. |

for the sum of _____
_____ DOLLARS (\$ _____)

being not less than the sum required under Section 103D-323, Hawai'i Revised Statutes and Chapter 3-122, Subchapter 24, Hawai'i Administrative Rules, payable to County of Hawai'i, Director of Finance.

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The Bidder represents: **(Check ✓ one only)**

☐ A **Hawai'i business** incorporated or organized under the laws of the State of Hawai'i; **OR**

☐ A **Compliant Non-Hawai'i business** not incorporated or organized under the laws of the State of Hawai'i, but registered at the State of Hawai'i, Department of Commerce and Consumer Affairs Business Registration Division to do business in the State of Hawai'i.

State of incorporation: _____

Offeror is:

☐ Sole Proprietor

☐ Partnership

☐ Corporation

☐ Joint Venture

☐ Other _____

Federal I.D. No.: _____

Hawai'i General Excise Tax License I.D. No.: _____

Business street address: _____

City, State, Zip Code: _____

Payment address (if different than business street address above): _____

City, State, Zip Code: _____

Telephone No. _____

Facsimile No. _____

Email Address _____

Date: _____

Respectfully submitted,

Authorized (Original) Signature of Bidder

Print Name

Print Title

(If by Individual or Partner)

Name

(If by Corporation)

*Exact Legal Name of Company (Offeror)

*If Offeror is a “dba” or a “division” of a corporation,
furnish the exact legal name of the corporation under
which the awarded contract will be executed:

**President

(SEAL)

** Please attach to this page evidence of the authority of this officer to submit bid on behalf of the company, giving also his address and the names and addresses of the Vice-President and Secretary.

NOTE: Fill in all blank spaces with the information asked for or bid may be invalidated.
Reference is made to Article 2.7 (Preparation of Proposal) of the General Requirements and Covenants (July, 1972).

LISTING OF RESPONSIBLE ENTITIES

In compliance with the provisions of Chapter 103D-302, HRS, and Chapter 3-122-21, Subchapter 5, Hawai'i Administrative Rules, the Bidder shall record hereinafter the names of each person or firm to be engaged by the Bidder as a joint contractor or subcontractor in the performance of the public work construction contract.

In order for the County to ensure the Bidder's compliance with the Hawai'i Supreme Court's January 28, 2002 decision in *Okada Trucking Co., Ltd. V. Board of Water Supply, et. al.*, 97 Haw. 450 (2002), the Bidder shall record hereinafter the names of each joint contractor, subcontractor, lower tier subcontractor or other entity that it intends to perform work on this Project.

In order for the County to determine the Bidder's responsiveness and responsibility, the Bidder shall provide the corresponding contractor license identification number issued by the State and describe the nature and scope of the work to be performed by each entity listed. Where work is to be performed by the Prime Contractor (Bidder) it shall list itself accordingly as the responsible entity.

Bids that do not comply with the requirements may be rejected at Director's discretion. Reference the Special Notice to Bidders for additional instructions and guidance.

| Name of Responsible Entity: (i.e., Prime-, Joint- or Sub- Contractor, etc.) | License I.D. | Nature and Scope of Work |
|---|---------------------|---------------------------------|
| C-2 | | |
| C-3 | | |
| C-13 | | |
| C-14 | | |
| C-17 | | |
| C-31 | | |
| C-32 | | |
| C-33 | | |
| C-37 | | |

(Attach additional sheets as necessary)
revised: 6/4/2012

HAWAI'I APPRENTICESHIP PREFERENCE

Section 103-55.6, Hawai'i Revised Statutes, as enacted by S.B. 19, Act 17, SLH 2009, provides for a Hawai'i Apprenticeship Preference for public works construction projects with estimated values of \$250,000.00 or greater. The preference shall be in the form of a five percent (5%) bid adjustment applied to the Bidder's bid amount.

Any Bidder seeking the Hawai'i Apprenticeship Preference for the purpose of this bid shall:

- (1) be a party to an apprenticeship program registered with the State Department of Labor and Industrial Relations (DLIR) at the time of its bid for each apprenticeable trade the Bidder will employ to construct the public works project for which the bid is made; and
- (2) completely fill-in the Schedule of Project Apprenticeship Trades attached here to attesting to the trades the Bidder will employ to perform the work; and
- (3) for each apprenticeable trade the Bidder will employ for this project, submit with its bid fully executed and authorized CERTIFICATION OF BIDDER'S PARTICIPATION IN APPROVED APPRENTICESHIP PROGRAM UNDER ACT 17 (FORM 1) form(s) issued by the DLIR verifying participation in apprenticeship program(s) registered with DLIR; and
- (4) fully execute the certification below.

Failure to comply with ALL of the conditions noted above, without exception, shall disqualify the Bidder from qualifying for, and thus receiving, benefit of the Hawai'i Apprenticeship Preference.

Subcontractors do not have to be a party to an apprenticeship agreement for the Bidder to obtain the preference.

Upon successful verification of the Bidder's executed Form I documents submitted with its bid, the Director will apply the Hawai'i Apprenticeship Preference and decrease the Bidder's total bid amount by five percent (5%) for evaluation purposes only. The Hawai'i Apprenticeship Preference will apply in conjunction with other statutory preferences (i.e., Hawai'i Products Preference).

While preference for Hawai'i Apprenticeship will be taken into consideration to determine the low bidder, the contract awarded shall be in the amount of the bid, exclusive of any preferences.

Upon applying for the Hawai'i Apprenticeship Preference, the Contractor shall certify each month that work is being conducted on the project, that it continues to be a participant in the relevant apprenticeship program for each trade it employs. Said monthly certification shall be made on MONTHLY REPORT OF CONTRACTOR'S PARTICIPATION IN APPROVED APPRENTICESHIP PROGRAM UNDER ACT 17 (FORM 2) form issued by the DLIR. Failure or refusal of the contractor to submit its monthly certification forms, or at any time during the construction of the project, cease to be a party to a registered apprenticeship agreement for each apprenticeable trade the contractor employs, the contractor will be subject to the sanctions afforded by law, as determined by the Director.

This requirement shall not apply if it will be in conflict with any Federal Law or if it would disqualify any County Agency from receiving federal funds or aid.

FORM 1 and FORM 2 (referenced above) are available on DLIR's Workforce Development Division's website at: <http://hawaii.gov/labor/wdd>

I do hereby attest that it is our intention to apply for the Hawai'i Apprenticeship Preference, that we satisfy all of the requirements to qualify for the preference, and that we shall comply with all applicable requirements conferred upon us by receiving this preference for the duration of the contract; and

I do hereby state that all of the information provided in the attached Schedule of Project Apprenticeship Trades is true and accurate:

Name: _____

Its: _____

Signed: _____

Date: _____

| SCHEDULE OF PROJECT APPRENTICESHIP TRADES | | |
|---|---|-----------|
| APPRENTICEABLE TRADES (as of 08/02/2011) | Bidder intends to employ a person or persons of the following trades in the performance of this project: (Initial below accordingly) | |
| Refer to: http://hawaii.gov/labor/wdd | YES | NO |
| Boilermaker | | |
| Bricklayer-Mason | | |
| Carpenter | | |
| Cement Finisher | | |
| Construction Craft Laborer | | |
| Construction Equipment Operator | | |
| Drywall | | |
| Electrical Wireperson | | |
| Electrician | | |
| (Electrician) Wireperson | | |
| Elevator Constructor | | |
| Fire Sprinkler Fitter | | |
| Floor Layer | | |
| Glazier | | |
| Heat and Frost Asbestos Insulator | | |
| Heavy Duty Repairman and Welder | | |
| Ironworker Shop Fabricator/Welder | | |
| Ironworker (Reinforcing) | | |
| Ironworker (Structural) | | |
| Painter | | |

~continued on next page~

| SCHEDULE OF PROJECT APPRENTICESHIP TRADES (cont'd) | | |
|---|---|-----------|
| APPRENTICEABLE TRADES (as of 08/02/2011) Refer to: http://hawaii.gov/labor/wdd | Bidder intends to employ a person or persons of the following trades in the performance of this project: (Initial below accordingly) | |
| | YES | NO |
| Paving Equipment Operator | | |
| Plasterer | | |
| Plumber | | |
| Pointer-Caulker-Weatherproofer | | |
| Refrigeration Air-Conditioning | | |
| Roofer | | |
| Sheet Metal Worker | | |
| Steamfitter/Welder | | |
| Stone Mason | | |
| Taper | | |
| Telecommunication/CATV Installer Technician | | |
| Tile Setter | | |
| Truck Operator and Driver | | |
| | | |
| | | |
| | | |

NOTE: The above listed trades are provided for the convenience of the Bidder and are based on the information available as of the date noted in the schedule's header. It shall be the Bidders responsibility to add, delete or appropriately amend the list to reflect the apprenticeable trades recognized by the State Department of Labor and Industrial Relations at the time Bidder's bid is made. Blank rows are provided in the above for this purpose.

HAWAII PRODUCT PREFERENCE

In accordance with Section 103D-1002, Hawai'i Revised Statutes, the Hawaii Products Preference is applicable to this bid. Hawaii products may be available for certain work required for construction of this project. The Hawaii products list is available on the State Procurement Office's ("SPO") website at <http://hawaii.gov/spo> (click on 'Procurement of Goods, Services and Construction – Chapter 103D, HRS' under 'Procurement' click on 'Preferences', under 'Preferences' click on 'Hawaii Products', under 'Hawaii Products' click on 'Hawaii Products List', under 'Hawaii Products List, Products Categories' click on Construction Products and Soil Amendment/Products to view the category. To view the Hawaii Products, click on each category. For further information about the manufacturer(s), click on the manufacturer(s) that is/are listed.

Bidders' attention is directed to the Special Provisions, Section 10 (Preferences), Subsection A (Preference for Hawai'i Products).

Bidders intending to include in their bids products that are NOT on the State Procurement Office's Hawaii Products List ("HPL") are directed to the section of these specifications titled "NOTICE TO PROVIDERS AND PROSPECTIVE PROVIDERS OF HAWAII PRODUCTS."

Determination of the low bidder will be based on the preference in effect at the time of bid opening. As of October 1, 2010, a ten percent (10%) preference is established for Class I Hawai'i products (provided that Hawai'i input exceeds 50%) and a fifteen percent (15%) preference is established for Class II Hawai'i products. The total bid, taking this preference into consideration and providing for additional bid criteria or preferences applicable to the project, shall be utilized in determining the apparent low bidder on the project. However, the contract amount shall be the amount of the bid offered exclusive of the preference.

Bidders shall completely fill-in the following SCHEDULE OF HAWAII PRODUCT PREFERENCE CLAIMS in accordance with the following instructions:

1. "Cost" shall be the total cost of furnishing the Hawaii product F.O.B. jobsite, unloaded, including applicable general excise tax and use taxes.
2. "Credit" shall be the quotient of the "Cost" and "%" values for each Hawaii product on this schedule. Where necessary, round up to the nearest penny.
3. Meanings of all other terms appearing on the Schedule shall be consistent with the SPO's HPL.
4. Fill-in all information neatly, legibly and completely. Abbreviations are acceptable provided no ambiguity is created by their use.

Bidders may copy the attached schedule and attach additional sheets as necessary.

The Director reserves the right to disqualify individual line item preferences claimed by the Bidder on the attached schedule due to use of non-certified Hawaii products; provision of inaccurate or incomplete information; or any other inconsistency or omission that may affect the award of the contract. The Bidder will be notified by the Director of any such disqualifications prior to award.

| SCHEDULE OF HAWAII PRODUCT PREFERENCE CLAIMS | | | | | | | | | |
|--|-----------------|--------------|-----------------------|----------|------|----------|------------|----------------|--|
| CERTIFIED HAWAII PRODUCT | | | | | | | PREFERENCE | | |
| Product Category | Class (I or II) | Manufacturer | Product & Description | Quantity | Unit | Cost (A) | % (B) | Credit (A x B) | |
| | | | | | | \$ | | \$ | |
| | | | | | | \$ | | \$ | |
| | | | | | | \$ | | \$ | |
| | | | | | | \$ | | \$ | |
| | | | | | | \$ | | \$ | |
| | | | | | | \$ | | \$ | |
| | | | | | | \$ | | \$ | |
| TOTAL: | | | | | | | | \$ | |

END OF PROPOSAL

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SECTION 01230 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Additive and Deductive Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ADDITIVE ALTERNATES AND DEDUCTIVE ALTERNATES

- A. **Additive Alternate No. 1:** Provide labor, materials and equipment as required to remove existing door and frame for Doors 09A and 09B. Provide labor, materials and equipment as required to install new CMU lintel at existing masonry opening and new door and frame for Doors 09A and 09B as called for on the Plans and Technical Specifications.
- B. **Additive Alternate No. 2:** Provide labor, materials and equipment as required to remove and modify existing site improvements as required for construction of a new stand-alone Hide Storage Building. Provide labor, materials and equipment as required to install a new stand-alone Hide Storage Building as indicated in the Contract Documents. The new Work for the new Hide Storage Building includes, but is not limited to, installation of concrete foundations, slabs, stairs and curbs, exterior masonry assemblies, Pre-engineered metal building system, standing seam metal roofing, sheet metal flashing and gutters, PVC rainwater leaders, metal pipe guardrail, fixed bollards, painting, plumbing systems, electrical systems, lighting, asphaltic paving, and related work, as called for on the Plans and Technical Specifications.
- C. **Additive Alternate No. 3:** Work includes, but is not limited to, provide labor, materials and equipment as required to install one new 1,000 gallon off-road diesel fuel tank, one new 1,000 gallon road diesel fuel tank, concrete support pads, and concrete bollards as called for on the Plans and Technical Specifications.
- D. **Additive Alternate No. 4:** Work includes, but is not limited to, provide ACCU-4, E-4a and E-4B. Provide all refrigerant piping, condensate drain piping, supports, bracing and incidentals required to complete a fully operational redundant refrigeration system for Room 12A, as called for on the Plans and Technical Specifications. Refrigeration system 3 and 4 shall operate using a lead-lag controller, systems shall switch automatically on a monthly basis.
- E. **Deductive Alternate No. 1:** Provide and install Vacuum Packaging Machine as described in Specification Section 111300/ EQUIPMENT, Para. 2.14.; Dicer as described in Specification Section 111300/ EQUIPMENT, Para. 2.15; and Mixing Grinder as described in Specification Section 111300/ EQUIPMENT, Para. 2.16. Electrical circuits and outlets associated with deductive equipment remain in basic scope of work
- F. **Deductive Alternate No. 2:** Provide and install Beef Paunch Truck as described in Specification Section 111300/ EQUIPMENT, Para. 2.12.; Beef Brisket Saw as described in Specification Section 111300/ EQUIPMENT, Para. 2.13; and Beef Hock Cutter as described in Specification Section 111300/ EQUIPMENT, Para. 2.17.

END OF SECTION 01230

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SECTION 074100 - PREFORMED METAL ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- B. Section Includes:
 - 1. Standing-seam metal roof panels for Additive Alternate #2.

1.03 MEASUREMENTS

- A. Field Measurements: Prior to fabrication of prefabricated panels, take field measurement of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication.

1.04 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, for compliance with the requirements of the 2006 International Building Code and based on testing according to ASTM E 1592.
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure of 20 lbf/sq. ft. acting inward or outward.
 - b. Basic Wind load of 105 mph, C Exposure, partially enclosed buildings (internal pressure).
 - c. Wind Importance Factor: 1.0.
 - 2. Deflection Limits: Metal roof panel assemblies shall withstand wind and snow loads with vertical deflections no greater than 1/240 of the span.

1.05 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product specifications, standard details, certified product test results, installation instructions and general recommendations, as applicable to materials and finishes for each component and for total system of preformed panels.

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B. Samples:

1. Submit 2 samples 12" square, of each exposed finish material.

C. Shop Drawings:

1. Submit small-scale layouts of panels on roofs, and large-scale details of edge conditions, joints, corners, custom profiles, supports, anchorages, trim, flashings, closures and special details. Distinguish between factory and field assembly work.

D. Delegated-Design Submittal: For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.

1.06 WARRANTY:

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Final Contract Acceptance.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: Twenty years from date of Final Contract Acceptance.

PART 2 - PRODUCTS

2.01 SHEET MATERIALS

A. Preformed Metal Roofing:

1. Metal roofing shall be "Commercial Rib" as manufactured by Custom Metal Roofing, or prior approved equal. Panels shall be prefinished 22 gauge steel. Roofing sheets to be of maximum lengths available for each plane of roof to achieve minimum splices. Color to be selected by Architect from the manufacturer's full line of standard colors.

B. Steel Sheeting:

1. 24-gauge, aluminum-zinc alloy coated steel (Zincalume) conforming to ASTM 792, AZ 50 coating, surface treated for maximum coating performance.

C. Finish:

1. The coating system on metal panels shall be a total dry film thickness of 1.0 mil minimum on both sides. The exterior color finish shall be a Kynar 500, 70% full strength on the exterior (weather) face with a 1.0 mil minimum off-white polyester enamel backer

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on the interior face. The exterior color shall be as selected from manufacturer's full range of custom colors.

2.02 MISCELLANEOUS MATERIALS

A. Fasteners:

1. Fasteners to be manufacturer's standard stainless steel screws with exterior heads gasketed. Exposed surfaces of fasteners to match finish of roof panels.

B. Flashing:

1. Minimum 24 gauge; types and locations as shown in the drawings.

C. Bituminous Coating:

1. Cold-applied asphalt mastic, SSPC paint 12, compounded for 15-mil dry film thickness per coat.

D. Sealants:

1. Sealants shall be only high quality products which meet or exceed federal specifications. Exposed sealant shall cure to rubberlike consistency. Concealed sealant may be a permanently non-hardening type. Oil or asphalt-type caulking are not acceptable. The materials shall be nonbleeding at 160 degrees F. and below and shall withstand temperature ranges from minus 50 degrees F. to 300 degrees F. without loss of adhesion, without slipping and shall have properties to allow the compound to move with the expansion and contraction of the structure.

E. Closure Strips

1. Closure strips shall be 1-inch wide foam material resistant to water and ultraviolet rays. Closure strips shall be precut to match the profile and cover the width of on panel sheet. Closures for hips shall be field cut from 1-inch by 2-inch closure materials. All closure strips shall have butyl adhesive/sealant on the top and bottom surfaces.

2.03 ACCESSORIES

A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

B. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum 0.018 inch thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.

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- C. Gutters: Formed from same material roof panels. Match profile of gable trim, complete with mitered corners, end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Join ends of each length with riveted and soldered joints. Expansion-type slip joints shall be provided at the center of the runs and at intervals of not more than 40-feet. Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.
- D. Downspouts: 4-inch diameter, Schedule 40 ABS pipe conforming to ASTM D 2751, diameter as indicated, secured with 16 gauge by 1-inch wide stainless steel Type 316 straps. Paint downspouts to match gutters.

2.03 PANEL FABRICATION

- A. General:
 - 1. Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, and as required to fulfill performance requirements, which have been demonstrated by factory testing. Comply with indicated profiles and dimensional requirements, and with structural requirements.
 - 2. Apply bituminous coating or other permanent separation materials on concealed panel surfaces where panels would otherwise be in direct contact with substrate materials which are non-compatible or could result in corrosion or deterioration of either material or finishes.
- B. Condensation:
 - 1. Fabricate panels for control of condensation, including proper inclusion of seals and provisions for breathing, venting, weeping and draining.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify substrate is uniform, even and symmetrical. Inspect to assure that all structural/framing members are flat so when the metal panel is applied, it will not appear wavy or distorted.
- B. Provide written report of discrepancies or variations in the substrate.
- C. Do not begin installation until unsatisfactory conditions are corrected. Beginning of installation shall signify acceptance of substrate and adjacent conditions as being proper and acceptable.

3.02 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Apply between underside of metal roof panel and top of metal purlins.

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3.03 INSTALLATION

- A. The metal panel system shall be installed plumb, level, and straight.
- B. Lap panels for coverage of two and one-half (2-1/2) currogations.
- C. The ribs shall be equidistant and shall align from corners, hips, valleys, mullions, and columns in accordance with architectural design parameters as shown on the Drawings.
- D. Installation shall be made in accordance with manufacturer's recommended procedures and layout drawings. Manufacturer's Handbook of Construction Details, SMACNA Architectural Sheet Metal Manual, and NRCA Roofing and Waterproofing Manual and Handbook of Roofing Knowledge shall be used as guides and for details wherever applicable.
- E. Unless otherwise noted end-lap all flashings and trim at least 3"; all flashings must be mitered, soldered and caulked to be watertight. All butt joints must be caulked. Soldered areas shall be counter-flashed or painted to match.
- F. Exercise proper care during installation to avoid damage or scratching of the panels. Avoid walking over the metal roof after installation is completed.
- G. Protection from Contact of Dissimilar Materials: Surfaces in contact with dissimilar metal shall be painted with heavy-bodied bituminous paint, or shall be separated by means of moisture-proof building felts and prevent electrolysis between the two materials.
- H. Joint Sealers:
 - 1. Install gaskets, joint fillers and sealants where indicated and where required for weatherproof performance of panel systems. Provide types of gaskets and sealants/fillers indicated or, if not otherwise indicated, types recommended by panel manufacturer.

3.04 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 3. Provide elbows at base of downspouts to direct water away from building.

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3.05 CLEANING AND PROTECTION

A. Damaged Units:

1. Replace panels and other components of the work which have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair procedures.

B. Cleaning:

1. Remove protective coverings and strippable films (if any) at time in project construction sequence which will afford greatest protection of work. Clean finished surfaces as recommended by panel manufacturer, and maintain in a clean condition during construction.

C. Protection:

1. Installer shall advise Contractor of protection and surveillance procedures, as required to ensure that work of this section will be without damage or deterioration at time of Final Contract Acceptance.

END OF SECTION 074100

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DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 133419 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes metal building systems that consist of integrated sets of mutually dependent components including structural steel main building frames and secondary framing including purlins and girts, columns, bracing, engineered and fabricated by the building system supplier.

1.02 RELATED SECTIONS

- A. See Division 03 Section "Cast-in-Place Concrete".
- B. See Division 05 Section "Architectural Metal Fabrications".
- C. See Division 05 Section "Pipe and Tube Railings".
- D. See Division 07 Section "Preformed Metal Roofing".
- E. See Division 07 Section "Sheet Metal Flashing and Trim".
- F. See Division 09 Section "Painting".
- G. See Division 22 Sections for Mechanical and Plumbing requirements.
- H. See Division 26 Section for Electrical requirements.

1.03 REFERENCES

- A. ASTM A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
- B. ASTM A36 – Specification for Carbon Structural Steel. ASTM A53 –Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- C. ASTM A53 – Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- D. ASTM A123 - ASTM A123 – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- E. ASTM A153 – Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- F. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
- G. ASTM A490- Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
- H. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

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- I. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- J. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
- K. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- L. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- M. ASTM A992 - Standard Specification for Structural Steel Shapes.
- N. ASTM F594 - Standard Specification for Stainless Steel Nuts.
- O. ASTM F844 - Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
- P. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- Q. AWS D1.1 – Structural Welding Code – Steel.
- R. AWS D1.8 – Structural Welding Code – Seismic Supplement.
- S. AWS A2.0 - Standard Welding Symbols.
- T. AISI - Specification for the Design of Cold-Formed Steel Structural Members - 1986 Edition with 1989 Addendum.
- U. “Specification for Design, Fabrication, and Erection of Structural Steel for Buildings” of the American Institute of Steel Construction.
- V. ASTM A570-92 - Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.
- W. ASTM E1514-93 - Specification for Structural Standing Seam Steel Roof Panel Systems.
- X. MBMA Low Rise Building Systems Manual - 1996 Edition.
- Y. SSPC (Steel Structures Painting Council) - SP-2-89 - Specification for Hand Tool Cleaning.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity and all other loads and forces prescribed by the 2006 International Building Code, and as described in the Contract Documents. Members shall withstand:
 - 1. Building System dead loads.
 - 2. Live load of 20 psf without tributary area load reduction.
 - 3. Collateral load, in addition to self weight of building materials, of 3 psf.

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4. Basic Wind load of 105 mph, C Exposure, partially enclosed buildings (internal pressure).
 - a. Effective Windspeed 120 mph, $K_{zt} = 1.3$.
5. Framing:
 - a. Type: Clear span rigid frame pinned at the base.
 - i. Primary Framing: Rigid frame of rafter beams and columns, end wall columns and wind bracing.
 - ii. Secondary Framing: Purlins, girts, eave struts, flange bracing, canopy beams and other items detailed on the Drawings or referenced herein the Project Manual.
 - iii. Lateral Bracing: Horizontal loads not resisted by main frame action shall be resisted by rods in the sidewalls and rods in the roof.
- B. Seismic Performance: Design and engineer metal building systems capable of withstanding the effects of earthquake motions determined according to the building code, and as described in the Contract Documents.
 1. Seismic Occupancy Category I, Site Class D, Seismic Design Category D, ($S_s = 125$, $S_1 = 50$).
- C. Thermal Movements: Provide metal panel systems that allow for thermal movements resulting from the maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Assembly to permit movement when subject to temperature range of 40 to 100 degrees F.
- D. Roof Drainage: System to withstand rainfall intensity of 12-inches per hour with 15-minute duration. Size roof drainage systems per SMACNA manual.
 1. Roof Slope: As indicated on the Drawings.
- E. Bay Spacing: As indicated on the Drawings.
- F. Clear Opening Height: As indicated on the Drawings.
- G. Deflection requirements shall be in accordance with the applicable provisions of the AISC Steel Design Guide Series 3 – Serviceability Design Considerations for Low-Rise Buildings. Maximum lateral deflection shall be $H/60$.
- H. All loads shall be proportioned and applied in accordance with MBMA Low Rise Building Systems Manual and the 2006 International Building Code.

1.05 SUBMITTALS

- A. Product Data: For all metal building system components.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

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1. For installed products indicated to comply with design loads and forces, include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of Hawaii, responsible for their preparation.
 2. Anchor-Bolt Plans: Prior to fabrication submit anchor-bolt plans before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
 3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate column reactions, welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 4. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
 5. Structural steel drawings shall be stamped with original signature for use in obtaining the building permit for this project.
- C. Letter of Design Certification: Signed and sealed by a qualified professional engineer licensed in the State of Hawaii. Include the following:
1. Name and location of Project.
 2. Order number.
 3. Name of manufacturer.
 4. Name of Contractor.
 5. Building dimensions including width, length, height, and roof slope.
 6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 7. Governing building code and year of edition.
 8. Design loads and load combinations.
 9. Building-use category.
 10. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
- D. Welding certificates.
- E. Erector Certificate: Signed by manufacturer certifying that erector complies with requirements.
- F. Manufacturer certificate.
- G. Fabrication shall proceed based only on approved anchor bolt plan and building shop drawings.

1.06 QUALITY ASSURANCE

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- A. Erector Qualifications: An experienced erector who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- B. Manufacturer Qualifications: A qualified manufacturer and member of MBMA with minimum of five years experience manufacturing similar steel building systems in the United States of America.
 - 1. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by qualified professional engineer licensed in the State of Hawaii.
 - 3. Fabrication: Fabricate structural steel members in accordance with MBMA Low Rise Building Systems Manual and, for items not covered, AISC Specification for Structural Steel for Buildings.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Structural Steel: Comply with AISC's "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- E. Cold-Formed Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.
- F. Fabricate structural steel members in accordance with MBMA Low Rise Building Systems Manual, and, for items not covered, AISC – Specification for Structural Steel for Buildings.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness and with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

1.08 PROJECT CONDITIONS

- A. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.

1.09 COORDINATION

- A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

1.10 FIELD MEASUREMENTS

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- A. Metal building contractor shall verify that field measurements are as indicated on the erection drawings.

1.11 WARRANTY

- A. Metal building manufacturer shall provide manufacturer's standard material warranty of one year from Final Contract Acceptance. The warranty shall include but not be limited to warrant against corrosion of material.
- C. Metal building manufacturer shall provide a workmanship warranty of 5 years. The warranty shall include but not be limited to warrant against leaking from roofing, siding and flashing.
- D. The Surety shall not be liable for manufacturer's warranty beyond two years of the Final Contract Acceptance date.

1.12 ADMINISTRATION

- A. All nomenclature shall conform to the MBMA Low Rise Building Systems Manual.
- B. Coordination and administration of the work shall be in accordance with the MBMA Low Rise Building Systems Manual – Common Industry Practices.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Alliance Steel, Inc.
 - 2. American Buildings Company.
 - 3. American Steel Building Company, Inc.; Division of NCI Building Systems, LLP.
 - 4. Behlen Mfg. Co.
 - 5. Butler Manufacturing Company.
 - 6. Ceko Building Systems; Division of Robertson-Ceko Corporation.
 - 7. Crown Metal Buildings, Inc.
 - 8. Garco Building Systems.
 - 9. Gulf States Manufacturers, Inc.
 - 10. Mesco Metal Buildings; Division of NCI Building Systems, LLP.
 - 11. Metallic Metal Building Company; Division of NCI Building Systems, LLP.
 - 12. Package Industries, Inc.
 - 13. Southern Structures, Inc.
 - 14. Spirco Manufacturing; Division of Metal Building Products, Inc.
 - 15. Star Building Systems; Division of Robertson-Ceko Corporation.

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16. Steelex Systems Inc.

17. United Structures of America, Inc.

18. VP Buildings, Inc.; a United Dominion Company.

2.02 STRUCTURAL-FRAMING MATERIALS

- A. W-Shapes: ASTM A 992; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55.
- B. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55.
- C. Plate and Bar: ASTM A 36; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55.
- D. Steel Pipe: ASTM A 53, Type E or S, Grade B.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
- F. Structural-Steel Sheet: Hot-rolled, ASTM A 1011, Structural Steel (SS), Grades 30 through 55, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70 ; or cold-rolled, ASTM A 1008, Structural Steel (SS), Grades 25 through 80, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70.
- G. Metallic-Coated Steel Sheet: ASTM A 653, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G60 (Z180) coating designation; mill phosphatized.
- H. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, Structural Steel (SS), Grades 33 through 80 or High-Strength Low Alloy Steel (HSLAS), Grades 50 through 80; with G90 coating designation.
 - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792, Structural Steel (SS), Grade 50 or 80; with Class AZ50 coating.
- I. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
 - 1. Finish: Plain.
- J. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Plain.
 - 2. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with splined ends.
 - a. Finish: Plain.
- K. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends;

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ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.

L. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: Straight.
2. Nuts: ASTM A 563 hex carbon steel.
3. Plate Washers: ASTM A 36 carbon steel.
4. Washers: ASTM F 436 hardened carbon steel.
5. Finish: Plain.

M. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 hex carbon steel.
2. Plate Washers: ASTM A 36 carbon steel.
3. Washers: ASTM F 43 hardened carbon steel.
4. Finish: Plain

N. Threaded Rods: ASTM A 36

1. Nuts: ASTM A 563 (ASTM A 563M) [heavy] hex carbon steel.
2. Washers: ASTM A 36 carbon steel.
3. Finish: Plain

O. Primer: SSPC-Paint 15, Type I, red oxide.

2.03 FABRICATION, GENERAL

- A. Tolerances: Comply with MBMA's "Metal Building Systems Manual": Chapter IV, Section 9, "Fabrication and Erection Tolerances."

2.04 STRUCTURAL FRAMING

A. General:

1. Primary Framing: Shop fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 - a. Make shop connections by welding or by using high-strength bolts.
 - b. Join flanges to webs of built-up members by a continuous submerged arc-welding process.
 - c. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 - d. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.
2. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and

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other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

- a. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary structural members with specified primer after fabrication.
- B. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing. Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 1. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
 2. Frame Configuration: As indicated on drawings.
 3. Exterior Column Type: As indicated on drawings.
 4. Rafter Type: As indicated on drawings.
- C. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
 1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates.
 2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
- D. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jamps, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet prepainted with coil coating, unless otherwise indicated, to comply with the following:
 1. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes; minimum 2-1/2-inch-wide flanges.
 - a. Depth: 8"
 - b. Spacing: 4-foot o.c. maximum
 2. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees to flange and with minimum 2-1/2-inch-wide flanges.
 - a. Depth: 8"
 - b. Spacing: 4-foot o.c. maximum
 3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes; to provide adequate back-up for metal panels.

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4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary frame flanges.
 5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
 6. Base or Sill Angles: Minimum 3-by-2-by-0.0598-inch zinc-coated (galvanized) steel sheet.
 7. Purlin and Girt Clips: Minimum 0.0598-inch-thick, steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
 8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0598-inch-thick, zinc-coated (galvanized) steel sheet.
 9. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch-thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
 10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- E. Bracing: Provide adjustable wind bracing as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 (345); or ASTM A 529/A 529M, Grade 50 (345); minimum 1/2-inch-diameter steel; threaded a minimum of 6 inches at each end.
 2. Horizontal loads not resisted by main frame action shall be resisted by rods in the sidewalls and rods in the roof. Rod connections shall NOT punch through webs of columns/rafters. Rod connections to be clevis type with gusset plate welded to columns/rafters. Lateral bracing system shall be 100% redundant. For example, if two rows of bracing are used each set of braces shall be designed using 100% total lateral load. If three rows of bracing are used each set of braces shall be designed using 67% total lateral load. If 4 rows of bracing are used each set of braces shall be designed using 50% total lateral load.
- F. Bolts: Provide plain finish bolts for structural-framing components that are primed or finish painted. Provide hot-dipped galvanized bolts for structural-framing components that are galvanized.
- G. Factory-Primed Finish: Apply specified primer immediately after cleaning and pretreating.
1. Prime primary, secondary, and end-wall structural-framing members to a minimum dry film thickness of 1.5 mil.
 - a. Prime secondary steel framing formed from uncoated steel sheet to a minimum dry film thickness of 1.5 mil on each side.
 2. Prime galvanized members with specified primer, after phosphoric acid pretreatment.
- 2.05 METAL ROOF PANELS
- A. Roofing panel standards and requirements shall be as described in Division 7.
- 2.06 SHEET METAL FLASHING AND TRIM

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- A. Sheet metal flashing and trim standards and requirements shall be as described in Division 7.

2.10 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

PART 3 - EXECUTION

3.01 EXAMINATION AND ERECTION

- A. Before erection proceeds, survey elevations and locations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with Erector present, for compliance with requirements and metal building system manufacturer's tolerances. Verify Mechanical, Plumbing and Electrical utilities are in correct position.
- A. Provide access to the work as scheduled for Owner provided inspections, if required. The cost of any required inspections is the responsibility of the Owner.
- B. Upon delivery, the structural steel framing members shall be washed and protected from the elements by storing them in a sheltered area or using protective covers. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- C. Do not store materials or structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.
- D. Treat all rust and surface imperfections prior to installation.
- F. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated. Bracing furnished by the manufacturer for the metal building system cannot be assumed to be adequate during erection. The temporary guys, braces, falseworks and cribbing are the property of the erector, and the erector shall remove them immediately upon completion of erection.
- G. Erect metal building system according to manufacturer's written erection instructions and erection drawings and in accordance with MBMA Low Rise Building Systems Manual – Common Industry Practices.
- H. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer licensed in the State of Hawaii. Approval shall describe the allowable cutting and/or alterations.
- I. Set structural framing accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

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- J. Base Plates: Clean concrete and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Tighten anchor rods after supported members have been positioned and plumbed. Any gap between the designated bearing surface and base plates shall be filled with steel plates of required thickness matching the size of base plate and welded to base plate. Grouting to fill gaps shall not be used at base plates.
- K. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure.
- L. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level base plates to a true even plane with full bearing to supporting structures, set with anchor bolts.
 - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and snug-tightened or pretensioned joints.
- M. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts.
 - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 - 2. Locate and space wall girts to suit openings such as doors and windows.
 - 3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- N. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
 - 1. Tighten rod bracing to avoid sag.
 - 2. Locate interior end-bay bracing only where indicated.
- O. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- P. Erection Tolerances: Maintain erection tolerances of structural framing in accordance with MBMA Low Rise Building Systems Manual – Common Industry Practices.
- Q. After erection, prime welds, abrasions, and surfaces not galvanized.

3.02 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with preformed metal roofing and sheet metal flashings and other components described in Division 07 Sections.

3.09 CLEANING AND SHOP PRIMING

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- A. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC specifications as follows:
 - 1. SSPC-SP 2 "Hand Tool Cleaning."
 - 2. SSPC-SP 3 "Power Tool Cleaning."
 - 3. SSPC-SP 5 "White Metal Blast Cleaning."
 - 4. SSPC-SP 6 "Commercial Blast Cleaning."
 - 5. SSPC-SP 7 "Brush-Off Blast Cleaning."
 - 6. SSPC-SP 8 "Pickling."
 - 7. SSPC-SP 10 "Near-White Blast Cleaning."
 - 8. SSPC-SP 11 "Power Tool Cleaning to Bare Metal."
- B. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply 2 coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
- C. Painting: Apply a 1-coat, non-asphaltic primer complying with SSPC's "Painting System Guide No. 7" to provide a dry film thickness of not less than 1.5 mils. In addition, apply finish painting system as specified under Division 09 – PAINTING.

3.10 FIELD QUALITY CONTROL

- A. Special Inspector: Owner will engage a qualified special inspector to perform Special Inspections, as may be required, and to submit reports.

3.11 FIELD TOUCH-UP, CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates and accessories.
 - 1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
 - 1. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
 - 2. Remove weld splatters, loose weld slag and other deleterious material with wire brush and other methods. Apply paint conforming to ASTM A 780 to welded and abraded galvanized areas, in conformance with manufacturer's instructions.
 - 3. Abraded, burned or otherwise damaged shop coats shall be touched and/or refinished with the applicable shop coating noted above. After installation, paint connections and other areas where shop coat was omitted.

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4. Paint shall be applied with a hand brush, thoroughly worked into all joints, corners and open spaces and well brushed over the surfaces. Paint shall not be applied to wet or damp surfaces and shall be dry when the material is loaded for delivery to the work.

3.12 CORROSION PROTECTION

- A. Where metals are incompatible to other materials, the contact areas of these materials shall be back coated before erection with an approved bituminous paint or other insulation coating as recommended by the fabricator.
- B. After erection, all work shall be adequately protected against damage from grindings, polishing, cement or other harmful materials.

END SECTION 133419

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SECTION 238126 – HVAC SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 GENERAL REQUIREMENTS

- A. Section 230500, "Common Work Results for Plumbing and HVAC," with the additions and modifications specified herein, applies to this section.

1.3 WORK SPECIFIED IN THIS SECTION

- A. Provide complete and operating air conditioning systems. "Provide" shall mean "furnish and install" when used herein.
 - 1. Electrical: Provide all temperature and indicating controls for this work. Furnish motor starters for equipment under this section.
 - 2. Coordinate with work of other trades and/or being performed under Sections. Verify existing conditions, space requirements and adequacy, and a time schedule to avoid delay to the project.

1.4 WORK SPECIFIED IN OTHER SECTIONS

- A. Section 230500: Common Work Results for Plumbing and HVAC.
- B. Section 220700: Insulation of Mechanical Systems.
- C. Section 232300: Refrigerant Piping.

1.5 QUALITY ASSURANCE

- A. Qualifications of Manufacturers: Use projects produced by manufacturers regularly engaged in manufacture of similar items with a history of successful production.
- B. Qualification of Installers: Use adequate number of skilled workers who are thoroughly trained and experienced in the air conditioning and sheet metal crafts under the direct supervision of qualified superintendents.
- C. Supply certification by the manufacturer that the equipment and other items furnished conforms to specifications.

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- D. Comply with all the requirements of the County of Hawaii and the State of Hawaii.
- E. Obtain and pay for all fees, permits, licenses, assessments, and inspections required for this work.
- F. Unless specified under the General Provisions of the approved Construction contract, substitutions of another manufacturer's product for equipment specified hereinafter and for items with "or equal" after the brand name requires written permission by the Engineer substitution deadline. No substitution will be considered after the bid opening.

1.6 CODES AND STANDARDS

- A. Comply with the applicable codes of regulatory bodies having jurisdiction, including but not necessarily limited to the following:
 - 1. Uniform Building Code, 1994, with County of Hawaii addendums.
 - 2. Public Health Regulations, Department of Health, State of Hawaii - Chapter 28, Air Conditioning and Ventilation.
 - 3. State and Municipal regulations governing low pressure refrigerating plants.
 - 4. The Uniform Fire Code, 1994.
 - 5. International Energy Conservation Code, 2006.
 - 5. EPA.
- B. Conform to requirements of the following standards:
 - 1. American National Standards Institute (ANSI) Standards:

| | |
|------|---|
| B16 | Cast Copper Alloy Pipe Flanges and Fittings Class 150, 300, 400, 600, 900, 1500, & 2500 |
| B9.1 | Safety Code for Mechanical Refrigeration |
| C1 | National Electrical Code |
 - 2. National Fire Protection Association (NFPA) Standards:

| | |
|-----|--|
| 70 | National Electrical Code |
| 90A | Air Conditioning and Ventilating Systems |
| 96 | Grease Laden Exhaust Systems |
 - 3. Air Conditioning and Refrigeration Institute (ARI) Standards:

| | |
|---------|---|
| 443 | Sound Rating of Room Fan Coil Air Conditioning |
| 210/240 | Unitary Air-Conditioning and Air Source Heat Pump Equipment |
| 495 | Refrigerant Receivers |
| 710 | Liquid-Line Driers |
| 750 | Thermostatic Refrigerant Expansion Valves |
 - 4. Air Moving and Control Association (AMCA) Standards:

| | |
|-----|----------------------|
| 210 | Test Fans for Rating |
|-----|----------------------|

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| | |
|-----|---|
| 300 | Test Code for Sound Rating Air Moving Devices |
| 500 | Louvers, Dampers and Shutters |
| 510 | Application Manual for Air Louvers |

5. American Society of Heating, Refrigerating, and Air Conditioning Managers (ASHRAE):

15 Safety Code for Mechanical Refrigeration

Handbook, Applications
Handbook, Equipment

6. American Society of Mechanical Managers (ASME)

Section VIII Boiler and Pressure Vessel Code and Interpretations: Pressure Vessels, Division 1 1992 and Addendum 1992

7. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

SMACNA DCS HVAC - Duct Construction Standards Metal and Flexible
SMACNA HVACADLTM - HVAC Air Duct leakage Test Manual.
SMACNA HVACTAB HVAC System - Testing, Adjusting and Balancing

1.7 SUBMITTALS

- A. Unless specified under General Conditions, the Contractor shall submit six copies of each submittal required hereinafter.

1. Equipment Submittal: Before beginning work, submit for review manufacturers certified literature showing rating and dimensions of equipment and of a list indicating all materials and items that are of a different manufacturer or model than those specified. Include equipment wiring diagrams.
2. Shop Drawings: After review of equipment, submit for review dimensioned installation shop drawings to scale showing details where space requirement presents problems; proposed departures from the Contract Documents due to field conditions, requirements for concrete work, access panels, inserts in slabs, and openings in structure.
3. Shop drawings shall include as applicable: Identification of each equipment and component Dimensioned layouts and arrangement of equipment Operating, performance, and electrical characteristics, Elementary and Interconnecting wiring diagrams, Foundation and mounting data.
4. Identification: All submittals covering equipment shall be identified with the equipment numbers shown on the contract drawings and the system served.
5. Substitutions: Proposed substitutions, where allowed in the General Requirements of the Contract and Special Provisions, shall be included in the submittal and so indicated. Supporting data shall be furnished for all substitutions. Redesign made necessary by the use of bid pre-approved substitutions shall be the responsibility and at the expense of the Contractor.
6. Samples: When called for in the Technical Sections, furnish samples of materials which truly represent the materials to be used. Where samples are specified to demonstrate method of installation, furnish all ingredients and tools. Samples shall also be furnished when materials are proposed as substitutions for those specified. Materials used in the

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- work shall be identical to samples that have been approved by the Manager.
7. As Built Drawings: The Contractor shall submit to the County's Representative one (1) reproducible set of all mechanical contract drawings corrected to reflect the "as built" conditions of the mechanical installation. The drawings shall be kept up to date as the job progresses and shall be available for inspection at all times. Record changes from the contract drawings of all concealed ductwork and equipment. Indicate location of isolating dampers, and items requiring maintenance or inspection.
 8. Operation and Maintenance Manuals: Furnish operating and maintenance manuals on all equipment and the system as a whole bound between hard covers. Include for all equipment the manufacturer's name, model and serial number, operation and maintenance manuals, including control diagrams and source of service and replacement parts. When using published manuals covering more than one equipment item or model option, identify which data and instructions apply to the equipment furnished for this project. Submit one copy of the complete manual for review prior to final inspection.

Operating instructions shall include:

- a. General description of the system.
 - b. Step by step procedure to follow in putting each piece of equipment in operation.
 - c. Provide diagrams for the electrical control system showing the wiring of all related electrical control items and interlocks.
 - d. All air balance and test run reports.
 - e. Spare parts & vendors list.
 - f. Trouble shooting guide.
9. Certificates: The Manager will have the right to require a written certificate, dated and signed by a responsible employee of the Contractor, evidencing the performance of any portion of the work, or any testing; as a condition precedent to the acceptance of any work or the result of any test. Whenever a regulatory agency performs inspections or tests of any portion of the work, a certificate shall be furnished by the Contractor that the inspection or test was satisfactorily passed.

1.8 MATERIALS AND EQUIPMENT

- A. Air conditioning and ventilation equipment to be considered for bid purposes shall be from a manufacturer that has locally stocked spare parts, representation, and support of a factory authorized service organization within 500 miles of the site installation and has serviced manufacturer's units of comparable type, size and capacity as those specified herein. The manufacturer must have other units of comparable type, size and capacity installed and operating satisfactorily in the State of Hawaii for a minimum of two (2) years prior to bid opening.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Furnish new equipment, material, and accessories bearing the manufacturer's identification. Coordinate deliveries to avoid interferences or construction delays. Protect products during delivery, storage, installation and the remainder of the construction period after installation.

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1.10 GUARANTEE

- A. As specified in Section 230500: Common Work Results for Plumbing and HVAC
- B. Further, Contractor shall be held responsible for all damages to any part of the premises, building or contents caused by leaks or other defects in ducts, equipment or materials provided under this specification and Section 230500: Common Work Results for Plumbing and HVAC.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Asbestos Prohibition: No asbestos containing materials or equipment shall be used under this section. The Contractor shall ensure that all materials and equipment incorporated in the project as asbestos-free.

2.2 EQUIPMENT

- A. Capacities and characteristics of equipment are indicated on the drawings. See electrical drawings for all voltage and phase requirements of all equipment furnished under this work. Provide combination magnetic across-the-line starter and circuit breaker for each motor of mechanical equipment unless the equipment is factory wired to a single power connection or unless otherwise indicated hereinafter. Provide vibration isolators as indicated hereinafter.

| <u>Equipment</u> | <u>Isolator Description</u> | <u>Minimum Static Deflection</u> |
|-------------------------------------|-----------------------------|----------------------------------|
| Exhaust Fan Hangers, Evaporators | Vertical Spring Isolator | 1.00" |

Isolator mounting location shall be in accordance with manufacturers' dimensioned drawings. Isolators shall be sized to provide specified static deflection from manufacturers' published loading information at each mounting point, based on operating weight.

Isolator housing shall be hot dipped galvanized and hardware shall be Electro-Galvanized or Cadmium Plated. Springs in these housings shall be made rust resistant.

2.3 EXHAUST FANS

- A. In-line Exhaust Fan:
 - 1. Duct mounted exhaust fan shall be of the centrifugal belt drive in-line type, Greenheck Model BSQ or approved equal.
 - 2. Cabinet: The fan housing shall be of the square design constructed of heavy gauge galvanized steel and shall include square duct mounting collars. Fan construction shall include two removable access panels located perpendicular to the motor mounting panel. The access panels must be of sufficient size to permit easy access to all interior components.

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2. Motor: Motors shall be heavy duty ball bearing type, carefully matched to the fan load and furnished at the specified voltage, phase and enclosure. Motors and drives shall be mounted out of the airstreams. Motors shall be readily accessible for maintenance.
3. Fan Wheel: The fan wheels shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.
4. Fan Shaft and Pulley: Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts. Motor pulleys shall be adjustable for final system balancing.
5. Disconnect Switch: A NEMA 1 disconnect switch shall be provided as standard. Factory wiring shall be provided from motor to the handy box.
6. The fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.
7. Fans shall be licensed to bear the AMCA Certified Ratings Seals for both sound and air performance.

2.4 PACKAGE AIR CONDITIONER (PAC-1)

A. General Description

1. Packaged rooftop unit shall include compressor, evaporator coil, filters, supply fan, dampers, air-cooled condenser coil, condenser fan, water-cooled condenser, reheat coil, gas heaters, electric heaters, hot water coil, steam coil, exhaust fan, energy recovery wheel and unit controls.
2. Outdoor air handling unit shall include filters, supply fan, dampers, chilled water coil, DX evaporator coil, gas heaters, electric heaters, hot water coil, steam coil, exhaust fan, energy recovery wheel and unit controls.
3. Unit shall be factory assembled and tested including leak testing of the coils, pressure testing of the refrigeration circuit, and run testing of the completed unit. Run test report shall be supplied with the unit in the controls compartment's literature pocket.
4. Unit shall have decals and tags to indicate lifting and rigging, service areas and caution areas for safety and to assist service personnel.
5. Unit components shall be labeled, including pipe stub outs, refrigeration system components and electrical and controls components.
6. Estimated sound power levels (dB) shall be shown on the unit ratings sheet.
7. Installation, Operation and Maintenance manual shall be supplied within the unit.
8. Laminated color-coded wiring diagram shall match factory installed wiring and shall be affixed to the interior of the control compartment's access door.
9. Unit nameplate shall be provided in two locations on the unit, affixed to the exterior of the unit and affixed to the interior of the control compartment's access door.

B. Construction

1. All cabinet walls, access doors, and roof shall be fabricated of double wall, impact resistant, rigid polyurethane foam panels.
2. Unit insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot and shall be tested in accordance with ASTM D-1929 for a minimum flash ignition temperature of 610°F.

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3. Unit construction shall be double wall with G90 galvanized steel on both sides and a thermal break. Double wall construction with a thermal break prevents moisture accumulation on the insulation, provides a cleanable interior, prevents heat transfer through the panel and prevents exterior condensation on the panel.
4. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 210/240. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Refrigerant piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
5. Roof of the air tunnel shall be sloped to provide complete drainage. Cabinet shall have rain break overhangs above access doors.
6. Access to filters, dampers, cooling coil, reheat coil, heaters, exhaust fan, energy recovery wheel, compressor, water-cooled condenser and electrical and controls components shall be through hinged access doors with quarter turn lockable handles. Full length stainless steel piano hinges shall be included on the doors.
7. Exterior paint finish shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure.
8. Units with cooling coils shall include double sloped 304 stainless steel drain pans.
9. Unit shall be provided with through the left side horizontal discharge and return air openings. All openings through the unit shall have upturned flanges of at least 1/2 inch around the opening.
10. Unit shall include lifting lugs on the top of the unit.
11. Unit shall include interior corrosion protection which shall be capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure. Air tunnel, fans, dampers and economizer shall all include the corrosion protection.
12. Unit base pan shall be provided with 1/2 inch thick foam insulation.
13. Unit shall include factory wired control panel and heat access compartment LED service lights.

C. Electrical

1. Unit shall be provided with standard power block for connecting power to the unit.
2. Unit shall be provided with phase and brownout protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage, the voltage is more than 10% under design voltage, or on phase reversal.
3. Unit shall be provided with manual reset low temperature limit controls which shut off the unit when the discharge temperature reaches a field adjustable setpoint.

D. Supply Fan

1. Unit shall include direct drive, unhooded, backward curved, plenum supply fan.
2. Blower and motor shall be dynamically balanced and mounted on rubber isolators.
3. Motor shall be a high efficiency electrically commutated motor.
4. Motor shall be high efficiency electrically commutated (EC) type with ODP enclosure.

E. Cooling Coil

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1. Evaporator Coil
 - a. Coil shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
 - b. Coil shall be 6 row high capacity.
 - c. Coil shall be helium leak tested.
 - d. Coil shall be furnished with a factory installed thermostatic expansion valve.
 - e. Coil shall have a flexible, epoxy polymer e-coat uniformly applied to all coil surface areas without material bridging between fins. Humidity and water immersion resistance shall be up to a minimum 1,000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 6,000 hours salt spray per ASTM B117-90. Coated coil shall receive a spray-applied, UV-resistant polyurethane topcoat to prevent UV degradation of the e-coat. Coating shall carry a 5 year non-prorated warranty.

F. Refrigeration System

1. Unit shall be factory charged with R-410A refrigerant.
2. Compressor shall be scroll type with thermal overload protection, independently circuited, and carry a 5 year non-prorated warranty.
3. Compressor shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam insulated panels to prevent the transmission of noise outside the cabinet.
4. Compressor shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressors into the building area.
5. Each refrigeration circuit shall be equipped with thermostatic expansion valve type refrigerant flow control.
6. Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides, and factory installed liquid line filter drier.
7. Unit shall include 1 stage of capacity control.
8. Unit shall include a variable capacity scroll compressor on the refrigeration circuit which shall be capable of modulation from 10-100% of its capacity.
9. Refrigeration circuit shall be provided with hot gas reheat coil, modulating valves, electronic controller, supply air temperature sensor and a dehumidification control signal terminal which allow the unit to have a dehumidification mode of operation, which includes supply air temperature control to prevent supply air temperature swings and overcooling of the space.
10. Unit shall be configured as an air-source heat pump. Refrigeration circuit shall each be equipped with a factory installed liquid line filter drier with check valve, reversing valve, accumulator, and thermal expansion valves on both the indoor and outdoor coils. Reversing valve shall energize during the heat pump heating mode of operation.
11. Refrigeration circuit shall be equipped with suction and discharge compressor isolation valves.
12. Each capacity stage shall be equipped with a 5 minute off, delay timer to prevent compressor short cycling.
13. Refrigeration circuit shall be provided with hot gas reheat coil, on/off control valves and a control signal terminal which allow the unit to have a dehumidification mode of

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operation.

14. Refrigeration circuit shall include adjustable compressor lockouts.
15. First capacity stage shall be provided with on/off condenser fan cycling and adjustable compressor lockout to allow cooling operation down to 35°F.
16. Refrigeration circuit shall be equipped with flooded condenser low ambient head pressure control to allow operation down to 0°F. Option includes on/off condenser fan cycling and adjustable compressor lockout.
17. Each refrigeration circuit shall be provided with an adjustable temperature sensor freeze stat which shuts down the cooling circuits when the evaporator coil tubing falls below the setpoint.

G. Condenser

1. Air-Cooled Condenser

- a. Condenser fan shall be vertical discharge, axial flow, direct drive fan.
- b. Coil shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
- c. Coil shall be designed for a minimum of 10°F of refrigerant sub-cooling.
- d. Coil shall be helium leak tested.
- e. Condenser fan shall be high efficiency electrically commutated motor driven with multiple speeds which are controlled with a fan cycle switch based on head pressure and allow matching condenser airflow with cooling capacity steps.
- f. Condenser fan shall be high efficiency electrically commutated motor driven with factory installed head pressure control module. Condenser airflow shall continuously modulate based on head pressure and cooling operation shall be allowed down to 35°F with adjustable compressor lockout.
- g. Coil shall have a flexible, epoxy polymer e-coat uniformly applied to all coil surface areas without material bridging between fins. Humidity and water immersion resistance shall be up to a minimum 1,000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to no less than 6,000 hours salt spray per ASTM B117-90. Coated coil shall receive a spray-applied, UV-resistant polyurethane topcoat to prevent UV degradation of the e-coat. Coating shall carry a 5 year non-prorated warranty.

H. Filters

1. Unit shall include 4 inch thick, pleated panel filters with an ASHRAE efficiency of 95% and a MERV rating of 14, upstream of the cooling coil. Unit shall also include 2 inch thick, pleated panel pre filters with an ASHRAE efficiency of 30% and MERV rating of 7, upstream of the 4 inch standard filters.
2. Unit shall include a clogged filter switch.

I. Controls

1. Factory Installed and Factory Provided Controller

- a. Unit controller shall be capable of controlling all features and options of the unit. Controller shall be factory tested.
- b. Controller shall be capable of stand alone operation with unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling available without dependence on a building management system.
- c. Controller shall have an onboard clock and calendar functions that allow for occupancy scheduling.
- d. Controller shall include non-volatile memory to retain all programmed values,

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- without the use of an external battery, in the event of a power failure.
- e. With modulating gas heat option, a field installed supply air temperature sensor shall be furnished to control the amount of heating. Supply air temperature setpoint shall be field adjustable.
- f. With enthalpy activated fully modulating economizer option, an outdoor air humidity sensor shall be factory installed.
- g. With the modulating hot gas reheat option a space humidity sensor and supply air temperature sensor shall be furnished with the unit for field installation. Suction pressure sensor shall be factory installed. Supply air temperature and space humidity setpoints, for the dehumidification mode of operation, shall be adjustable.
- h. Constant Volume Controller
- i. Outside air temperature sensor shall be factory mounted and wired. Supply air temperature sensor and space temperature sensor with temperature setpoint reset and unoccupied override shall be furnished with the unit for field installation.
- j. Make Up Air Controller Outside air temperature sensor shall be factory mounted and wired. Supply air temperature sensor shall be furnished with the unit for field installation.

2.5 AIR CURTAINS

- A. Acceptable Products: Berner International or approved equal.
- B. Construction: Provide factory-assembled units of sufficient structural strength to be supported from ends without intermediate support. Ship units completely assembled.
- C. Cabinet:
 - 1. Material: Minimum 316 stainless steel, all welded construction.
 - 2. Mounting: Provide for top of wall mounting.
 - 3. Removable top and bottom panel for access.
- D. Motors: As indicated on drawings.
- E. Fans: Balanced forward curved centrifugal type, double inlet, double width design, mounted in matched fan housings with aerodynamically formed air inlet venturis. Manufacture wheels and housings from ~~galvanized steel~~ **aluminum**.
- F. Discharge Nozzles:
 - 1. Provide uniform velocity across width of air door.
 - 2. Aperture: 3-1/2 inches slot by width of air door.
- G. Vanes: 1-1/2 inches minimum height; constructed of airfoil-shaped aluminum extrusions; adjustable plus or minus 20 degrees to deflect airflow.
- H. Inlet:
 - 1. Location: Top
 - 2. Screen: Perforated pattern 316 stainless steel with border.

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- I. Control Panel:
 - 1. UL listed, industrial type, pre-wired, with components consisting of motor starter, terminal strip, motor overloads, and control transformer with ~~{120} {24}~~ **120** volt fused secondary.
 - 2. Single power supply.
 - 3. Enclosure: Oil-tight and dust-tight corrosion resistant NEMA 4X stainless steel enclosure with neoprene door gasket.
 - 4. Mounting: Remote mounted.
- J. Provide brackets and other mounting accessories as required to permit installation and proper functioning of air door to meet project conditions of use.
- K. Fabricate wall brackets and accessories from stainless steel.
- L. Provide field mounted and wired NEMA 4 plunger style door switch for each opening.***

2.6 DUCT WORK AND ASSOCIATED SHEET METAL WORK

- A. Sheet Metal Ductwork:
 - 1. Where indicated on drawings, low velocity ducts shall be galvanized steel with gages and construction in accordance with Chapter 1, Air Duct Design, 1988 Equipment Volume ASHRAE Handbook. Use of duct board will not be approved.
 - 2. All high velocity ducts shall be galvanized steel with gages and construction in accordance with Chapter 1, Air Duct Design, 1988 Equipment Volume ASHRAE Handbook and Data Book.
 - 3. Splitter damper shall be adjustable with locking quadrant.
 - 4. Duct Flexible Connections: VENTFAB #3002, Elgen SDN-4, or equal, neoprene coated fiberglass fabric applied according to manufacturer's recommendations. Provide sheet metal bands or metal-edged fabric.
 - 5. All sheet metal duct work shall be sealed at all joints and made air tight by applying an approved sealant compound around all joints per the manufacturer's recommendations.
 - 6. All metal supply air duct shall be insulated with 1" thick rigid board insulation on the outside of the duct. Provide sheet metal jack with crossbreak on all exterior supply ductwork, as shown on drawings.
- B. Fiberglass Ductwork:
 - 1. Where indicated on drawings, ductwork, including fittings, shall be constructed of filament wound fiberglass reinforced plastic, manufactured per SMACNA, ASTM D 2996, and industry standard PS 15-69 minimums. Designed for min 12" WC pressure and 12" WC vacuum. A minimum designed structural safety factor of 5 shall be used.
 - 2. Resins:
 - a. 10 mil liner & 100 mil corrosion barrier

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- 1) Hetron FR 992 w/3% antimony trioxide
 - 2) Derakane 510A w/5% antimony trioxide
 - 3) Eastman Chemical 755-8590 w/3% antimony trioxide
 - b. Structural:
 - 1) Hetron 99P w/3% antimony trioxide
 - 2) Derakane 510C w/3% antimony trioxide
 - 3) Eastman Chemical 745-4586 w/3% antimony trioxide
3. The laminate shall consist of two of the above resins. Resin shall not contain fillers except as required for thioxotropic control of fire retardance. The duct and fittings, as a finished composite shall meet the Flame requirements (25) of a Class 1 duct per UL 181 and UMC 10-1, and ASTM E-84. Wall thickness shall comply with PS 15-69 duct standards. The ductwork shall be furnished with the following:
 - a. Minimum wall thickness 0.125" for ducts up to 20" in diameter, 0.187" for ducts 21" to 36" in diameter, and 0.25" for ducts 37" to 60" in diameter.
 - b. Rectangular Ductwork wall thickness shall be determined by substituting the long side for the round diameter. The inner surface shall contain a 10 mil thick "C" veil saturated with a premium resin from above, (approx. 90% by weight resin). This will be followed by a 100 mil corrosion barrier (2 layers of 1-1/2 oz. chopped mat) with the same resin as used on the 10 mil liner. The structural layer shall be as required for design service and shall be filament wound using resin as detailed above.
 - c. Duct exterior shall have a relatively smooth surface free of exposed fibers and shall contain an ultra violet inhibiting agent in the gel coat. All resin and joint material is suitable for a 200°F service.
 - d. Ductwork shall double wall with 1" of insulation, k factor of 0.14 and an R-value of 7. The duct OD wall thickness shall be equal to the minimum wall thickness above.

2.7 AIR DISTRIBUTION DEVICES

- A. All plastic construction for face plates, frames and grilles:
 1. Supply Registers: All plastic construction, sidewall/ceiling register constructed of engineered polymer, four-way deflection with bright white finish, Hart and Cooley RZ684 or approved equal.
 2. Volume Dampers:
 - a. For sheet metal ductwork: All aluminum construction with locking device. Contractor shall provide access doors at all volume damper locations to provide for adjustments during balancing of the air conditioning system. Ruskins or equal.
 - b. Volume dampers for fiberglass ductwork shall be as provided by ductwork manufacturer.
- B. Turning Vanes: Tuttle and Bailey, or equal, non-adjustable double thick turning vanes for 90o elbows. Sonoturn, or equal, non-adjustable double thick acoustic turning vanes with perforated vanes and acoustic filter for 90o elbows when indicated.

2.8 CONDENSATE PIPE AND FITTINGS

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- A. Condensate Drain Piping: Type "M" or "DMV" copper tube with wrought copper drainage pattern fittings or Schedule 80 PVC pipe and drainage pattern fittings with solvent welded joints. Provide seal trap at connection to unit to accommodate system static pressure or as recommended by the equipment manufacturer. When copper tube is used insulate with 3/4 inch Armaflex insulation.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

- A. The work shall be performed by workmen skilled in the type of work involved, under experienced supervision. Where methods of application or installation are specified by commercial standards in the Technical Sections, no departures will be permitted except as specified or as directed by the Manager.

3.2 PREPARATION

- A. Visit the work-site and become fully aware of all existing conditions. Investigate the Contract Documents and make proper provisions to avoid interferences or construction delays. Determine the exact route of each duct and pipe.
- B. Make offsets and changes in shape or direction required to maintain proper headroom and pitch or to accommodate the structure and the work of other trades. When changing the shape of duct work, provide ducts having the same friction loss as the size of the duct shown on the Contract Documents. Furnish other trades with information to properly locate and size openings in the structure required for the work under this Section. Furnish anchor bolts, sleeves, inserts and supports required for the work under this section. Provide access panels for concealed items provided under this section that require maintenance, adjustment or inspection.

3.3 INSTALLATION REQUIREMENTS

- A. Perform work using personnel skilled in the trade involved. Provide competent supervision. Furnish new equipment, materials and accessories bearing the manufacturer's identification and conforming to the recognized commercial standards. Provide OSHA approved guard all around exposed moving machinery parts and around high-temperature equipment and materials. When exposed to weather, provide a protective enclosure around electrical equipment, controls and other items that are not satisfactorily protected. No piping, electrical conduit, ceiling supports or similar items shall be supported from air conditioning equipment or duct work.

3.4 EQUIPMENT INSTALLATION

- A. Install equipment in the space allotted with sufficient clearance for proper operation and maintenance, and with sufficient head clearance according to the building code. Where equipment differs in arrangement or connections from those shown, provide all required changes in piping, supports and appurtenances. Provide equipment accessories necessary for

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proper operation and support. Concrete equipment bases and supports are under DIVISION 3 CONCRETE. Direct trade providing concrete in the proper locations, dimensions, load carrying capacity and anchor bolt locations. Concrete pads shall be not less than 6 inches above adjacent surfaces and shall extend 6 inches beyond the base of the equipment. Provide vibration isolators for all mechanical equipment as indicated hereinbefore. Secure floor-mount isolators to base and to equipment. Provide concrete inserts at all pre-stressed planks for hanger rods and coordinate with pre-stressed plank contractor for insert location.

3.6 PIPING SYSTEM SUPPORTS

- A. Pipe Supports: Factory-fabricated by Elcen, Fee and Mason, Grinnell, or Unistrut. Provide concrete inserts, beam clamps, channel framing, hanger rods and accessories required for proper pipe support. Ramset or explosive type anchors are not permitted. Support copper pipe at maximum spacing of 6 feet for pipes 1-1/2 inches and smaller. Support vertical piping with hanger at base of riser and with pipe clamp at each floor. At each support point on insulated piping, provide Owens-Corning Kaylo Pipe Insulation around pipe with 18-gage sheet metal jacket each two pipe diameters in length.

3.7 INSPECTION AND TESTS

- A. The Contractor shall give the County notice one week in advance when the work is ready for inspection and tests. The tests shall be performed as required in the Technical Sections. All work rejected by the Manager shall be repaired or replaced and retested by the Contractor at no additional cost to the County.

3.8 PROTECTION DURING STORAGE

- A. All materials and equipment shall be stored in a safe manner. Secure weather and fire protection shall be floor level to avoid damage by moisture.

3.9 PROTECTION OF WORK IN PROGRESS

- A. Duct openings shall be closed with caps until connections are made. Equipment shall be securely covered for protection against physical or chemical damage. In areas exposed to weather, materials unused at the end of each day's work shall be stored in weather-protected locations. Damage to materials or equipment due to the Contractor's neglect shall be repaired or replaced to the satisfaction of the Manager by, and at the expense of the Contractor.

3.10 PROGRESS OR WORK AND COORDINATION

- A. The work shall be coordinated with the work of other contractors and other trades to avoid interferences, preserve headroom and operating clearances, and to expedite completion of the project. Furnish other trades with information to properly locate and size openings in the structure required for the work under this section. Furnish sleeves, inserts and supports required for the work under this section. Provide access panels for concealed items provided

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under this section that maintenance, adjustment or inspection.

3.11 INSTALLATION OF EQUIPMENT

- A. The Contractor shall protect all equipment during storage and shall install the equipment complete and operable. Installation and adjustments shall be in accordance with the equipment supplier's written instructions. All accessories required shall be properly installed and connected. Supports shall be adequately anchored and vibration isolation shall be installed where required.

3.12 PERMITS, LICENSES, AND INSPECTIONS

- A. The Contractor shall obtain all permits and licenses required to perform the work, and pay all the fees therefore, and shall cooperate with all inspection required by authorities having jurisdiction. Inspection specified in the Technical Sections shall be permitted without inference. Corrections to work as a result of inspection shall be made promptly.

3.13 FIELD TESTS

- A. The Contractor shall be responsible for tests of the installed work, and shall provide all labor, equipment and instruments and shall conduct operating tests on the equipment. Should operating tests require the presence of manufacturer's representatives, the Contractor shall cooperate with them and shall place at their disposal all assistance, materials and service required to perform such tests. Testing shall be as specified hereinafter.

3.14 ELECTRICAL WORK

- A. Conform to the requirements of ANSI, CI, National Electrical Code, and to the requirements of DIVISION 26 ELECTRICAL of these specifications. Obtain equipment manufacturer's control wiring diagrams for the equipment furnished. Prepare a control and interlock wiring diagram for the complete system. Indicate terminal connection points to factory-wired equipment. Submit control diagram for review. Furnish motor starters for all electrically driven air conditioning and ventilating equipment, complete with circuit breaker, one overload relay per phase, 120-volt control circuit and horsepower rating. Provide NEMA 3R weatherproof starter with fiberglass enclosure for outdoor equipments.

3.15 TESTING

- A. Notice of Tests: Give written notice in ample time to all concerned of date when tests will be conducted.
- B. Prior Tests: Leave concealed or insulated work uncovered until required tests have been completed, but if construction schedule requires it, arrange for prior tests on parts of systems as approved.
- C. Preliminary Tests: As soon as conditions permit, conduct preliminary or "turn-over" tests of

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certain equipment as directed, to ascertain compliance with specified requirements. Make needed changes, adjustments or replacements as preliminary tests may indicate, prior to acceptance test.

- D. Acceptance Tests: Conduct pressure, performance and operating tests as specified for each system or equipment unit, in presence of Manager or other accredited representative, as well as representatives of agencies having jurisdiction. Conduct automatic capacity reduction control test for the air cooled condensers. Submit test data to the Manager for review and approval.
- E. Costs: Furnish labor, material, instruments and bear other costs in connection with all tests. Installed instruments may be used for tests, if calibrated and approved for the purpose.
- F. Defects: All defects disclosed as result of the following or other tests or operations shall be promptly repaired by and at the expense of Contractor and to Manager's and County's representative's satisfaction Contractor shall supply all instruments, labor and tools required by tests. Any defective material and/or equipment shall be repaired, adjusted and replaced by new, like materials and equipment, and retested before acceptance.
- G. Certificates: Obtain certificates of approval, acceptance and compliance with regulations of agencies having jurisdiction. Work shall not be deemed complete until such certificates have been delivered to the County's representative.

3.16 DRAIN PANS AND DRAIN LINES

- A. Drain pans sloping toward the condensate drain pan outlet to prevent water accumulation in the drain pan (no standing water).
- B. Condensate drain pans shall include p-traps and drain lines. P-traps depth shall be one inch greater than the air-conditioning unit's static pressure. Drain lines shall be the same size as the air-conditioning unit's drain pipe connection if no longer than twenty feet and with a minimum of one bend/elbow.
- C. Continuous drain line slope shall be provided so water is not retained in the condensate drain pans and/or lines.

3.17 DUCTWORK AND ASSOCIATED SHEETMETAL

- A. Sheet Metal Ductwork: Construct in accordance with the SMACNA HVAC Duct Construction Standards - Metal and Flexible. Duct system shall be constructed for a commercial system with a minimum of 3 inch W.G. pressure. Provide curved elbows with inside radius equal to the duct width. At Contractor's option, 90-degree elbows may be square with factory fabricated airfoil turning vanes. Provide factory fabricated adjustable air extractors in straight branch duct tap-ins or use radius tap-ins. Provide adjustable air extractors at supply air registers and diffuser tap-ins. Provide splitter dampers at all splits in the duct runs constructed in accordance with Plate 29, Fig. A of SMACNA Duct Manual. Provide dampers where indicated with opposed blades and locking quadrant. Provide flexible duct connections at inlet and outlet of all air moving devices. Seal watertight all ductwork exposed to weather, and cross break to shed water. Provide stiffeners as required to assure no water puddling.

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- B. Fiberglass Ductwork: Field joints shall be butt-type wet lay-up method. Flanged connections shall be provided where indicated on the contract drawings. Both of these joining methods are of the same material as the duct, thus forming a continuous FRP component system. Follow manufacturer's written instructions for proper installation of ductwork. Overhead ductwork, when exposed, shall be manufactured incorporating a color selected by the architect.
- C. Sizes of exterior wrapped ducts shown on drawings are net inside dimensions.

3.18 INSULATION SYSTEM

- A. Insulation of this work is under section 220700 "Mechanical Insulation Systems", unless otherwise indicated hereinafter.
- B. Install insulation system in accordance with manufacturer's recommendations using tradesman skilled in this trade and approved by the insulation manufacturer. Provide insulation products with a composite (insulation, jacket and adhesive) fire and smoke hazard rating as tested under ASTM E84, NFPA 255 and UL 723, not exceeding a flame spread of 25 and smoke developed of 50.

3.19 AIR CONDITIONING SYSTEMS TEST AND BALANCING

- A. Test work as specified herein. Provide test meters, other instruments, materials, labor in connection with tests. Check and test gages, thermometers, other instruments after their installation.
- B. The completed work shall be tested, adjusted and balanced to meet design requirements as indicated on the drawings and as specified herein. Inside of all ducts shall be blown clean before being placed in operation and all filters shall be replaced before operational tests and final acceptance.
- C. Two (2) weeks before the expected completion date, the Contractor shall put all equipment into operation and shall continue operation of same during each working day until all adjusting, balancing, testing, and cleaning of systems have been completed.
- D. Preparation for System Balancing: Contractor shall be responsible to make changes in pulleys, belts and dampers where found necessary to obtain the required air volume at no additional costs to the County. All duct work and coils shall be cleaned and left free of loose insulation and construction debris.

Filter shall be clean at the commencement of final balancing.

All fans shall be initially started, lubricated and balanced to eliminate noise and vibration.

Contractor shall supply and install all balancing and adjusting dampers shown and as required to obtain final system balance at no additional costs to the County.

- E. System Balancing: An independent Test and Balance contractor shall provide all labor, Managing and test equipment required to adjust and balance all air conditioning systems as hereinafter specified. All personnel involved in the execution of the work under the balancing contract shall be experienced and trained in the total balancing of mechanical systems. All

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work shall be done under the direct supervision of a qualified Manager. Balancing procedure shall be as recommended in the SMACNA Manual for the balancing and adjustment of air distribution systems. All instruments shall be accurately calibrated. Tests shall be as conducted in the presence of a representative of the Manager and/or County's representative.

- F. Test and Balance Procedure for Air: Measure supply air volumes by means of the duct traverse method, taking a minimum of sixteen (16) readings. Seal duct access holes with metal snap-in plugs. The use of duct tape to seal access holes will not be permitted.

Adjust balancing dampers for required branch duct air quantities. Permanently mark final set point of all dampers and controls.

Adjust grilles and diffusers to within 10 percent of the individual requirements specified, and also adjust so as to minimize drafts in all areas.

The total air delivery in any particular fan system shall be obtained by adjustment of the particular fan speed. The drive motor of each fan shall not be loaded over the corrected full load amperage rating of the motor involved.

Any changes that are required for the final balancing results as determined by the balancing contractor will be provided for the respective contractors who are to supply and install such equipment under their contractual obligations at no additional expense to the County. Such changes may encompass, but are not necessarily restricted to, the changing of pulleys, belts, dampers or adding dampers or access holes.

- G. Automatic Control System: In cooperation with the control manufacturer's representative, set and adjust automatically operated devices to achieve required sequence of operations. Testing organization shall verify all controls for proper calibration and list those controls requiring adjustment by control system installer.
- H. Submission of Reports: Fill in test results on approved report forms. Submit three certified copies of required test reports to the County's Representative for approval.

3.20 CLEANUP

- A. Cleanup the work provided under this section. Touch up with matching paint all damaged factory finishes.

3.21 INSTRUCTIONS

Instruct the County's representative in the proper operation and maintenance of the system. Review the maintenance manuals with the County's representative. Post starting and stopping instructions and control diagram adjacent to equipment, mounted in frame with glass cover plate. Submit a list of manufacturer's warranties for the equipment furnished.

3.22 CERTIFICATES

The County's representative shall have the right to require a written certificate, dated and

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signed by a responsible employee of the Contractor, evidencing the performance of any portion of the work, or any testing, as a condition precedent to the acceptance of any work or the results of any test.

Wherever a governmental authority performs inspections or tests of any portion of the work, a certificate shall be provided by the Contractor that the inspection or test was satisfactorily passed.

END OF SECTION

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SECTION 335613 – FUEL STORAGE AND PIPING SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section covers the furnishing, fabrication, delivery and installation of the fuel storage and piping system complete, including but not limited to the following:
 - 1. Above ground diesel fuel storage tank.
 - 2. Fuel dispenser
 - 3. Fuel and vent piping system.
 - 4. Leak detection monitoring system.
 - 5. Pipe, valves and fittings.
 - 6. Electrical conduits, wiring and components pertaining to the monitoring and control system.
 - 7. Operation and maintenance instruction manuals.
 - 8. Manufacturer's literature, shop drawings and record drawings.
 - 9. Inspection, test and guarantee.
 - 10. Photovoltaic system
- B. All power required for the storage tank systems, including but not limited to leak detection monitor, dispenser, and overfill alarm shall be supplied by a tank mounted photovoltaic system. System shall be SP-180 W with Model MKE-27 battery as manufactured by Clearskies, Inc. or an approved equal. There shall be one system per tank.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Mechanical work as specified in SECTION 230500 – COMMON WORK RESULTS FOR PLUMBING & HVAC.

1.4 CODES, STANDARDS, REGULATIONS

- A. Comply with all the requirements specified in SECTION 230500 – COMMON WORK RESULTS FOR PLUMBING & HVAC.

1.5 CONTRACT DRAWINGS

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- A. Comply with all the requirements specified in SECTION 230500 – COMMON WORK RESULTS FOR PLUMBING & HVAC.

1.6 SUBMITTALS

- A. Submit the following in accordance with SECTION 230500 – COMMON WORK RESULTS FOR PLUMBING & HVAC.

1. Manufacturer's Catalog Data:
 - a. Above ground diesel fuel storage tank.
 - b. Fuel dispenser
 - c. Tank fittings and attachments.
 - d. Leak detection monitoring system.
 - e. Tank level probes.
 - f. Tank interstitial sensors.
 - g. Remote alarms.
 - h. High level sensor.
 - i. Pipe valves and fittings.
 - j. Electrical components and controls.
 - k. Fuel strainer
 - l. Photovoltaic system
2. Drawings: Show the general arrangement of all components, clearances and principal dimensions including overall length, width and height, controls and electrical schematic drawings. Include weight of components, capacities and clearances. Submit shop drawings and control diagrams showing new system equipment arrangement for the diesel fuel system.
3. Statements:
 - a. Permits
 - b. Personnel license/certifications
4. Field Test Reports:
 - a. Leak detection monitoring system tests
 - b. Pneumatic test
 - c. Operational test
5. Certificates:
 - a. Tank fittings and attachments
 - b. Pipe and fittings
 - c. Valves
6. Operation and Maintenance Manuals: Operation and Maintenance manuals shall be provided for each major system including but not limited to:

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- a. Above ground diesel fuel storage tank
 - b. Fuel dispenser
 - c. Leak detection monitoring system
 - d. Tank level probes
 - e. Remote alarms
 - f. Tank interstitial sensors
 - g. High level sensors
 - h. Monitoring control panel
 - i. Photovoltaic system
7. Bound Instructions: Three (3) complete sets of instructions containing the manufacturer's operating and maintenance instructions for each piece of equipment and system as a whole shall be furnished to the Contracting Officer. Each set shall be permanently bound and shall have a hard cover. One (1) complete set shall be furnished prior to final inspection, and the remaining sets shall be furnished before the contract is complete. The following identification shall be inscribed on the cover. The wording, "OPERATING AND MAINTENANCE INSTRUCTIONS," the name and location of the building, the name of the Contractor, the name of the Consultant, date, and the contract number. Also include a list of equipment by manufacturer, with the model number and serial number, tag number, quantity of each unit, location of unit, and area served. When standard manufacturer's brochures are used, adequately indicate (highlight, arrow, etc.) the project related information and delete (X or cross-out) the non applicable information. Flysheet shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8-1/2 by 11 inches, with large sheets of drawings folded in. The instructions shall include, but shall not be limited to the following:
- a. Table of Contents
 - b. System layout showing equipment and piping
 - c. Wiring and control diagrams, with data to explain the detailed operation and control of each component.
 - d. A control sequence describing start-up, operation and shutdown.
 - e. Operating and maintenance instructions for each piece of equipment, including lubrication instructions.
 - f. Manufacturer's bulletins, cuts and descriptive data.
 - g. Parts list and recommended spare parts.
8. Field-Posted As-Built Drawings: Submit as-built drawings.

1.7 SPARE-PARTS DATA

- A. After approval of materials and equipment and one month prior to the date of beneficial occupancy, the Contractor shall furnish a complete list of parts and supplies, with current source of supply.
- B. Operation Data: Include installation instructions and exploded assembly views.
- C. Maintenance Data: Include maintenance and inspection data, replacements part numbers and availability, and service depot location and telephone number.

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- D. Provide (4) copies of Operations and Maintenance manual. One copy shall be attached to tank in a clear PVC weather resistant document tube.

1.8 SUBSTITUTION OF MATERIAL

- A. Request for substitutions prior to awarding of contract, complete with catalog data, shall be furnished to the Contracting Officer for approval in accordance with GENERAL CONDITIONS.
- B. Design is based on equipment as described in drawings. Any changes in equipment, bases, piping, connections, controls, electrical equipment, specified and required by approved substitutions shall be made by Contractor at no additional cost to the State. Contractor shall ensure proper fit, clearances, operation and maintainability for any equipment that is substituted for that indicated.

1.9 OMISSIONS

- A. It is the intent of the plans and specifications to provide a complete installation. Should there be omissions; the Contractor shall call the attention of the Contracting Officer to such omissions in fifteen (15) days advance of the date of bid opening so that the necessary corrections can be made.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Furnish new equipment, materials and accessories bearing the manufacturer's identification. Coordinate deliveries to avoid interference or construction delays. Protect products during delivery, storage, installation, and the remainder of the contract period after installation.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.11 QUALITY ASSURANCE

- A. Standard Products: Materials shall be resistant to diesel fuel and other petroleum based products conforming to requirements of FS W-F-SOO, "Fuel Oil, Diesel". Completed installation shall conform to applicable requirements of NFPA 30, "Flammable and Combustible Liquids Code".
- B. Permitting: Contractor shall obtain necessary permits in conjunction with installation of underground petroleum piping as may be required by federal, state, or local authority. Submit copy of permits to the Contracting Officer.
- C. Licensed Personnel: Personnel required to install underground petroleum piping shall be licensed/certified by the State of Hawaii. Submit copy of license/certification to the Contracting Officer.

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- D. Safety: Ensure employees are trained in requirements of 29 CFR 1910.1200, "Hazard Communication", and understand information contained in material safety data sheets for their protection against toxic and hazardous chemical effects.
- E. Manufacturer's quality program for Fiberglass Reinforced Plastic (FRP) pipe shall be in compliance with ISO 9001 and/or API Q1
- F. Installation shall be in compliance with the latest version of the Petroleum Equipment Institute Publications RP 200, and NFPA-30, 30A and all manufacturers' current installation instructions.
- G. Comply with NFPA 30 "Flammable and Combustible Liquids Code" and NFPA 30A "Automotive and Marine Service Station Code" for design and construction, installation, inspection, and testing of fuel dispensing system components and accessories.
- H. Comply with NFPA 70 "National Electric Code" for equipment, wiring, and conduit installed under this section.

1.12 GUARANTEE AND CERTIFICATE

- A. Contractor shall provide guarantee and certificate as specified in SECTION 230500 – COMMON WORK RESULTS FOR PLUMBING & HVAC.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. All materials shall be new, of equal or better quality of materials specified, and approved by the Contracting Officer. For ease of maintenance and parts replacement, select equipment from a single manufacturer as much as possible. Substitutions require approval prior to award of contract.
- B. All materials shall be suitable for the service intended. Service will be No.2 fuel oil (diesel) as indicated.

2.2 ABOVE GROUND FUEL STORAGE TANK

- A. General: Tank provided shall be either of the two specified tank types in paragraph 2.02.B or 2.02.C. Each provided AST shall be UL listed for compliance with UL 2085, as an insulated, secondary containment above ground storage tank, protected type. Each tank shall bear the UL label in compliance with UL 2085.
- B. Secondly Contained (Steel Vaulted) Tank: Tank system shall include a primary storage tank and an integral fully-enclosed secondary containment reservoir. Tank system shall be in

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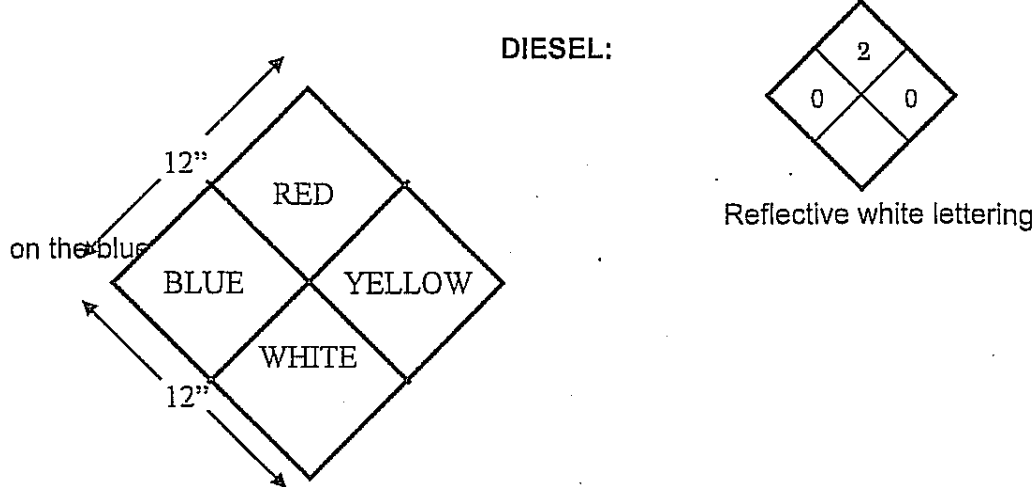
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accordance with NFPA 30 and NFPA 30A. Tank system shall be designed and manufactured for horizontal installation. Primary storage tank shall be constructed of single wall steel in accordance with UL 142. Containment reservoir shall be single-wall steel conforming to UL 142. The interstitial space between the storage tank and the containment reservoir shall be filled with a 2-hour fire rated insulating concrete inhibitor in accordance with UL 2085. Tank system shall bear the UL 2085 label. The volume of the containment reservoir shall be greater than or equal to 110 percent of the primary tank volume. The primary storage tank shall be supported within the containment reservoir with steel tank saddles or other similar supports, fabricated and attached by the tank manufacturer. Containment reservoir shall be equipped with a 3 inch drain that includes a full line size carbon steel drainage line and a full line size plug valve. Tank system shall be skid mounted and provided with lifting lugs which allow tank system relocation.

- C. **Secondarily Contained (Concrete Vaulted) Tank:** Tank system shall be a factory fabricated, concrete encased storage tank with integral secondary containment. Tank system shall be in accordance with NFPA 30 and NFPA 30A. Tank system shall be designed and manufactured for horizontal installation. Primary storage tank shall be constructed of single wall steel in accordance with UL 142. The primary tank shall be isolated from the exterior concrete vault with either insulation, an inert material, or minimum 2 inch standoffs. Tanks isolated with insulation or an inert material shall then be encased by a minimum of 30 mil, high density, polyethylene liner. The lined tank shall be encased by a minimum of 6 inch of 4,000 psi strength, monolithically poured, reinforced concrete. Tank system shall have a 2-hour fire rating, and conform to the requirements of UL 2085, and bear the UL 2085 label. No exterior enclosure shall be allowed to cover the reinforced concrete. Tank system shall be skid mounted and provided with lifting lugs which allow tank relocation.
- D. **Tank Exterior Protective Coating:** Tank exterior protective coating shall be the manufacturer's standard except as modified herein. Concrete vaulted type tanks shall be provided with a white epoxy exterior coating on the top and sides to resist weather and to reflect sunlight.
- E. **Tank Interior Protective Coating:** Tank shall be provided with an interior protective coating in accordance with manufacturer's recommendations.
- F. **Tank Manway:** Tank manway shall be provided with a manway cover and an interior tank ladder. Tank manway shall have an internal diameter of 18 inch as indicated. Tank manway shall be provided with a matching flanged watertight manway cover. Manway covers shall be constructed of cast steel in accordance with ASTM A 27/A 27M, grade 60-30 as a minimum. Manhole covers shall be for nontraffic. Interior tank ladder shall be constructed of either fiberglass or steel. If steel, the ladder shall be completely coated in the same fashion as the interior tank bottom coating. The two stringers shall be a minimum 3/8 inch thick and a minimum 2 inch wide. The rungs shall be a minimum 3/4 inch rod on 12 inch centers. Members of the ladder shall be securely affixed. Ladder shall be of sufficient length to extend from the bottom of the tank to the top surface of the tank. Ladder shall be rigidly connected to the tank bottom in accordance with the tank manufacturer's standard. Ladder shall be connected to the top of the tank with pipe guides or slip bars to accommodate expansion of the two stringers.
- G. **Tank Piping Penetrations:** The number and size of tank piping penetrations shall be provided as indicated. Dielectric bushings shall be provided on all pipe connections to a tank. Pipe

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connections to a tank shall be through welded-inplace double tapered NPT couplings. The termination of fill lines within a tank shall be provided with an antispash deflector. Tank suction line shall be provided with a footvalve to prevent line drainage.

H. Tank Signage

1. The tank shall be provided with signs affixed to the tank exterior in a visible location. The signs shall be red letters on white background with minimum size 3" high, 1/2" stroke. The signs shall indicate the following:
 - a. **"NO SMOKING OR OPEN FLAMES WITHIN 25 FEET"** on all approachable sides and dispensing area within 25 feet.
 - b. **"DANGER FLAMMABLE LIQUID"** on all approachable sides, 3" high, 1/2" stroke, red letters on white background.
 - c. Warning labels conforming to NFPA 704 Hazard Labeling System on all approachable sides (12" square, NFPA standard style and colors).
 - d. The tank shall be provided with a label indicating its empty lifting weight (1" high, 3/16" stroke).
2. The diesel tank shall be provided with labels affixed to the tank exterior indicating the following information:
 - a. **"CAUTION: This tank to contain only petroleum products"** at the fill port (3/4" high, 1/8" stroke).
 - b. **"No2 DIESEL"** on the dispenser (1" high, 3/16" stroke, red letters on white).
 - c. **"XXXX GALLONS"** is the actual compartment capacity near the fill port. Contractor shall insert actual tank capacity for tank furnished.
 - d. **"Vent"** at the vent riser.
 - e. **"Emergency Vent"** at the emergency vent fitting.
 - f. **"Monitor Tube"** or **"Test Well"** at the monitor tube.
 - g. **"Owner/Operator: XXXX"** : 1" G x 1/8" stroke letters, red on white, on or under the dispenser on tank.
 - h. **NFPA 704** identification of the fire hazards of material placards. On all approachable sides of tank.

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i. **"IN CASE OF FIRE OR SPILL"**

a. **Use emergency pump shutoff**

b. **Report the accident:**

Fire Department No. _____

Facility Address: _____

1"H x 3/16" stroke, red on white, on or under the dispenser tank

j. **"PRODUCT 1.0. DIESEL"** on dispenser: 1"H x 3/16" stroke, red on white.

k. **"PRODUCT 1.0."** tag on fill pipe: 3/4" H letters, red on white.

- I. Tank Fittings and Attachments: Provide tank with the following fittings and attachments as indicated or required:
1. Male and female camlock fill connection.
 2. Supply drop tube with foot valve.
 3. Tank level gauge fitting.
 4. Free flow vent type for diesel and riser. Overall riser height as indicated.
 5. Emergency primary and secondary vent. Size as indicated.
 6. 1.5-inch anti-siphon valve with explosion relief to prevent draining the tank in the event of a piping failure.
 7. Interstitial leak detection connection with lockable cap, clearly marked.
 8. Supply and Return drop tubing for fuel polishing system supply and return lines.

2.3 FUEL DISPENSER

- A. Fuel dispenser shall be FR702 Pump and Meter Dispenser with manual nozzle as manufactured by FILL-RITE or an approved equal.

2.4 STORAGE TANK ACCESSORIES

- A. Storage Tank Fill Automatic Shutoff Valve: Shall restrict flow to 2 gallons per minute when tank reaches approximately 90% of capacity. Provide with OPW 633-T or approved equal aluminum 4" fill adapter and OPW 634-TT or approved equal 4" fill cap.
- B. Storage Tank Emergency Vent: Provide primary tank emergency pressure relief vent for all storage tanks, with aluminum body and lid, carbon graphite shear pin designed to break at 2.5 psi, spring loaded lid, stainless steel link designed to break at 3.5 psi and cast iron bar designed to break at 6.5 psi, and 8" connection. Provide OPW 202-F or approved equal. Provide aluminum emergency vent adapter for emergency vent tank connections less than 8".
- C. Storage Tank Vent: Provide primary tank vents for all storage tanks, with aluminum body and 2" connection. Provide OPW 23 or approved equal open vent for all other tanks. Provide vent riser with height as indicated.

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- D. Storage Tank Manual Gage Post: Provide OPW 61-T or approved equal aluminum 4" drop tube for all storage tanks. Provide OPW 61-TP or approved equal zinc plated steel bottom protector with Buna-N disk on strike plate.

2.5 LEAK DETECTION MONITORING SYSTEM

The system shall be UL and FM approved, intrinsically safe for use in hazardous locations. The system shall include the monitoring panel, remote displays, probes, sensors, alarm annunciators, sensor and control wiring, transformers, and connectors, supplied by a single manufacturer. Electrical connections below grade shall be buried service wire splice encapsulation kits. Provide PVC conduit with sweep elbows for all buried cable incidental to the monitoring and leak detection system. Devices shall be as manufactured by Ronan, Veeder-Root or approved equal.

- A. Monitor Panel: Provide a microprocessor based wall-mounted monitoring panel capable of interfacing with the sensors, probes, and alarms specified hereinafter. The monitor shall be housed in a NEMA 4 enclosure with visual indicators for power, alarm, and warning conditions. A liquid crystal display with function keys, numeric keypad and an integral printer capable of providing a hard copy record of the amount of fuel dispensed in understandable English shall be provided. The monitoring system shall be suitable for continuous operation, reporting both normal operating conditions and system malfunctions or failures. The monitor panel shall include 4 relays with alarm capabilities for the following conditions: tank high water level, tank low liquid level, overfill, and tank leak. The monitor shall be capable of handling multiple sensors. Provide cables, sensor/input/output/communications modules, connectors, battery back-up, and mounting and installation hardware. Provide Ronan X76CTM-N4-1 or approved equal.
- B. Tank Interstitial Sensor: Provide a sensor which shall function in the leak detector tube of the interstitial space for the storage tank as indicated. The sensor shall meet NFPA 30, "National Electrical Code", Class I, Division 1, Group D for hazardous location. The sensor shall have the ability to detect the presence of liquid in the interstitial space and provide an alarm condition. The monitoring system shall have the ability to continuously monitor the integrity of the sensor for an open condition, alarm condition, or normal operating condition. Sensor shall be compatible with the fluid which it is monitoring.
- C. Tank Level Probe: Provide an electronic, magnetostrictive wire probe which shall have the ability to collect in-tank fluid height and temperature data. The probe shall interface with the monitoring panel which in turn shall be capable of providing on-demand inventory reports, which shall include fluid volume, fluid height, fluid temperature, date, and time. After a delivery of fuel to the tank has been completed, the system shall be capable of providing an inventory report on the monitor panel, which shall include the starting volume in the tank, ending volume in the tank, net increase in volume, date, and time. Probe shall be compatible with the fluid which it is monitoring.
- D. Remote Alarm Panel: Provide an alarm capable of providing both audible and visual warnings of a potential overfill to the operator making a fluid delivery to the tank. The alarm panel shall be equipped with a push button to provide the operator with the ability to acknowledge the alarm and silence the audible indicator. The alarm and acknowledgment switch shall be designed to

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operate in an outdoor environment. The system shall have a programmable alarm limit. Alarm enclosure shall be NEMA 4 or NEMA 4X rated.

- E. High Level Alarm Sensor: Provide a sensor which will function in the tank space of each storage tank as indicated. The sensor shall meet NFPA 30, "National Electrical Code", Class I, Division I, Group D for hazardous location. The sensor shall have the ability to detect the presence of liquid at the high/overflow limit of the tank and provide an alarm condition. Sensor shall be compatible with the fluid it is monitoring.

2.6 FUEL PIPING SYSTEM

- A. Piping:
 - 1. Above ground: Provide ASTM A53, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless", schedule 40 for piping greater than or equal to 2" and schedule 80 for less than 2", seamless black carbon steel pipe suitable for the temperature pressure of the service fluid or waste product system. Piping system shall be threaded and/or welded.
- B. Fittings: Provide threaded or welded forged steel fittings conforming to ANSI B16.3 and ANSI B16.39, Class 300 for above ground piping only. Fittings shall be suitable for the working pressure and temperature of the service fluid and waste product. Threaded fittings shall be permitted for use as adapters to equipment, pumps, valves, etc. Provide Vogt or approved equal.
- C. Ball Valves: Provide ball valves where indicated, rated 300-pound class or class suitable for the temperature and pressure of the system, forged steel body, threaded, chrome plated steel ball, teflon seats. Valve materials shall be suitable for the service fluid and provide leak tightness.
- D. Check Valves: Single poppet or ball check type, 300-pound class or class suitable for the temperature and pressure of the system. Forged steel valve, valves, 2-inch and smaller, shall have screwed ends. Valves 2-inch and larger shall have flanged ends. Valve materials shall be suitable for the service fluid and shall provide leak tightness. Provide Vogt or approved equal.
- E. Basket Strainer: Provide simplex basket strainer with cast steel body, 316 stainless steel strainer baskets with not larger than 1/8-inch perforations, yoked cover and flanged end connections. Strainer shall have a minimum pressure rating of 150 psi with a maximum clean pressure drop of 2.5 psi at indicated fuel flow rate. Strainer shall be suitable for use with No.2 diesel fuel oil. Basket Strainer shall be for outdoor applications, capable of handling exposure to all weather conditions.
- F. Dry Disconnect Coupling: Provide dry disconnect coupling with aluminum body, Buna-N seal and flanged end connection. Truck end connection shall be in accordance with API standards. Coordinate actual coupling to be provided with the State's fuel supplier.
- G. Dielectric Unions: ASME/ANSI B16.39, "Malleable Iron Threaded Pipe Unions Classes 150, 250 and 300 (ASME)", Class 250 pound. Dielectric unions conforming to dimensional, strength and pressure requirements of FS WW-U531, Class 1. Union shall have water-impervious insulation barrier capable of limiting galvanic current to one (1) percent of the short-circuit

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current in a corresponding bimetallic joint. When dry, it shall be able to withstand a 600-volt breakdown test.

- H. Gaskets: Provide woven non-asbestos fibers with fluorocarbon plastic binder or compressed with nitrile or neoprene binder compatible with either diesel fuel oil or lubricating oil.

2.7 ANTI-SIPHON VALVE

- A. Anti-siphon valve shall be aluminum or ductile iron construction, UL listed, stainless steel spring, factory adjusted head pressure setting, adjustable pressure setting, internal pressure relief valve. All materials shall be compatible with diesel fuel. Provide OPW 199ASV, EBW 636 or approved equal.

2.8 SPECIAL WIRING

- A. All factory assembled, package type equipment shall be provided with integral control panel to which all motors in each unit shall be factory wired. Control panel shall contain all relays, starters, and other control devices, all arranged so as to be accessible for maintenance, testing, and inspection. Control panel on each unit shall contain 120 volt control transformer installed so that all control circuits extending to remote control devices, etc., will be 120 volts maximum.
- B. Any wiring not shown and required to properly connect equipment, including connections to special safety control or apparatus not shown, shall be included under this Section.
- C. All electrical conduit and wiring between the control panel, tank, emergency alarm panel and packaged pump set shall be provided by the contractor in accordance with all manufacturer's recommendations and the National Electric Code. Wiring, equipment, and fittings shall be explosion-proof in conformance with applicable requirements of UL 698 and UL 886 for Class I, Division 1, Group C and D hazardous locations.

2.9 MISCELLANEOUS SIGNS

- A. Provide a "NO SMOKING" sign within 15 feet of point of transfer while filling operations are in progress at container or vehicles (i.e. at aboveground fuel tank, fuel dispenser). Sign shall be made from aluminum with plastic laminate to protect the printed message from the weather, minimum size 10 inches high by 7 inches wide. Lab Safety Supply 1A-744s or approved equal.
- B. All signs shall conform to the requirements of ANSI Z535. Provide fasteners for wall mounting or galvanized steel U-channel or square tubing sign posts with concrete footing for free standing locations.

2.10 PHOTOVOLTAIC SYSTEM

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- A. All power required for the storage tank systems, including but not limited to leak detection monitor, dispenser, and overfill alarm shall be supplied by a tank mounted photovoltaic system. System shall be SP-180 W with Model MKE-27 battery as manufactured by Clearskies, Inc. or an approved equal. There shall be one system per tank.

PART 3 – EXECUTION

3.1 DIESEL STORAGE TANK

- A. When moving, handling or working around the storage tank ensure no damage occurs to the tank or separator, its fittings and attachments, concrete pad, piping, or the leak detection monitoring system components. Cap all unused fittings to prevent the introduction of foreign matter into the tank or separator.
 - 1. Installation: Install storage tank as indicated and in accordance with manufacturer's instructions. Tank shall be anchored to the concrete pad. Coordinate work among trades to prevent conflicts or delays. Verify proper locations for piping and conduit penetrations through the concrete pad and anchor bolt locations prior to pouring concrete. Install all tank and separator fittings after tank or separator is anchored. Fittings shall be properly protected from damage during installation.

3.2 PIPING

- A. Above ground piping systems shall be of steel. Piping connections to equipment shall be as required by equipment manufacturer. Clean pipe interior of foreign matter. When work is not in progress, close open ends of pipe and fittings so that water, earth, or other substances cannot enter. Replace pipe, fittings, or appurtenances found defective after installation. Make threaded joints with tapered threads and make tight with joint compound; compatible with intended petroleum products, applied to male threads only. Install in accordance with the pipe manufacturer's recommendations.
 - 1. Installation: Handle tubing, pipe and accessories to ensure sound, undamaged condition. Provide Stauff clamps or equal for attachment and anchoring of tubing and pipes to building structure. Sleeves through concrete may be 20-gage metal, fiber, or other approved material. Sleeves shall be located on center with piping and fastened in place. Space between sleeves and pipe shall be caulked and filled with bituminous plastic cement or mechanical caulking units designed for such use.

3.3 LEAK DETECTION MONITORING SYSTEM

- A. General: Provide all wiring, conduit, junction boxes, and other devices required for the leak detection monitoring system. Wiring, equipment, and fittings shall be explosion-proof in conformance with applicable requirements of UL 698 and UL 886 for Class I, Division 1, Group C and 0 hazardous locations. Submit proof of such conformance for approval. Installation shall conform to requirements of NFPA 70. Store and handle all leak detection monitoring system components to ensure sound, undamaged condition. Do not drop, strike, or

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otherwise mishandle the components, which could result in loss of calibration or damage. All damaged equipment shall be replaced with new equipment at no additional cost to the State.

- B. Monitor Panel: Mount the monitor panel as indicated and in accordance with the manufacturer's instructions. Provide necessary mounting hardware. Provide power to the monitor panel.
- C. Probes and Sensors: Install probes and sensors as indicated and in accordance with the manufacturer's instructions. Pre-test probes and sensors prior to installation. Do not allow foreign matter to enter the storage tank or interstitial space during installation. Probes and sensors shall not be damaged during installation.
- D. Remote Alarm Panels: Mount the remote overfill alarm and acknowledgment switch as indicated and in accordance with the manufacturer's instructions. Provide necessary mounting hardware.

3.4 ELECTRICAL WORK

- A. Provide wiring, conduits, switches and devices required for controlling electrical equipment. Wiring, equipment, and fittings shall be explosion-proof in conformance with applicable requirements of UL 698 and UL 886 for Class I, Division 1, Group C and 0 hazardous locations. Submit proof of such conformance. Electrical installations shall conform to requirements of NFPA 70.
- B. All power required for the storage tank systems, including but not limited to leak detection monitor, dispenser, and overfill alarm shall be supplied by a tank mounted photovoltaic system to be sized and provided by the tank distributor.

3.5 FUEL SYSTEM FLUSHING AND OPERATIONAL TEST

- A. Install temporary piping or hose equipped with a strainer having not less than 40mesh screen between supply pipe and tank fill connection on tank from which fuel is being pumped. Furnish temporary pump for flushing. Clean means absence of sediment or emulsion; bright refers to fluorescent appearance of fuel that has no cloud or haze. Test system to demonstrate performance requirements for which it was designed. Test shall include unloading fuel trucks to demonstrate effectiveness of overfill and overspill protection system. When a portion of each system or a piece of equipment fails to pass tests, make repairs or adjustments and repeat test until satisfactory performance is achieved. Tests shall be witnessed by the Contracting Officer, and the Contractor shall notify the Contracting Officer a minimum of 14 days before testing. Furnish calibrated instruments and equipment, as well as the fuel, required to clean and flush each system and to conduct tests. Upon completion of tests replace filters.

3.6 LEAK DETECTION MONITORING SYSTEM TEST

- A. Activate leak detection monitoring system and test in accordance with manufacturer's instructions and witnessed by the Contracting Officer. All deficiencies shall be corrected and the system re-tested.

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3.7 EQUIPMENT TEST, INSPECTION AND OPERATION

- A. Test and Inspection: Perform all field tests and trial operations, and conduct all field inspections. Provide all labor, equipment, and incidentals required for the tests. Contracting Officer shall witness all field tests and trial operations and shall conduct final field inspections. Give the Contracting Officer ample notice of the dates and times scheduled for tests, trial operations, and inspections which require the presence of the Contracting Officer. All deficiencies found shall be rectified and work affected by such deficiencies shall be completely retested at the Contractor's expense.
- B. Operation: Place into operation all equipment provided and installed, except as specifically noted otherwise. Make all necessary adjustments to equipment to assure proper operation as instructed by the manufacturers of the equipment. Lubricate equipment prior to operation in accordance with the manufacturer's instructions. Dry out all motors before operation as required to develop and maintain proper and constant insulation resistance.

3.8 PAINTING AND IDENTIFYING

- A. The items furnished under this section are to be painted and identified under SECTION 09900 - PAINTING. Do not paint over name plates or other identifying labels

3.9 PIPING IDENTIFICATION

- A. Identification of all new pipe lines shall be by means of colored, waterproof, all temperature, self-adhering labels and directional arrow. Color coding shall conform to ANSI/OSHA specifications.
- B. All exposed pipes, whether insulated or not shall be identified. Labels may be omitted from piping where the use is obvious, due to its connection to equipment and where the appearance would be objectionable in finished rooms, as approved by direction.
- C. Identification labels shall be placed as follows:
 - 1. Near each valve branch connection
 - 2. Wherever piping merges or disappears from view from the floor of the room in which it is installed
 - 3. Labels shall not be more than 50 feet apart.

3.10 IDENTIFICATION OF VALVES

- A. Provide 1-1/2" diameter brass tag for all valves with identification numbers shown on the drawings. Each tag shall have stamped service designation and valve number designation in 1/4" black-filled letters over 1/2" black-filled numbers. Tags shall be fastened to valves with brass jack chain. Chart of all valves shall be furnished by the Contractor and shall include:
 - 1. Valve I.D. number
 - 2. Location

PA'AUILO SLAUGHTERHOUSE IMPROVEMENTS

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3. Purpose of system (Service)
4. Normally open or normally closed
5. Type and size of valve

3.11 POSTED OPERATING INSTRUCTION

- A. Furnish approved operation instructions for each principal item of equipment for the use of the operation and maintenance personnel. The operation instructions shall include wiring diagrams, control diagrams and control sequence for each principal item of equipment. Operating instruction shall be printed or engraved and shall be framed under glass or in approved laminated plastic and posted where directed by the Contracting Officer. Operating instruction shall be attached to or posted adjacent to each principal item of equipment including start-up, procedure in the event of equipment failure and other items of instruction as recommended by the manufacturer of each item of equipment. Operating instructions exposed to the weather shall be made of weatherresistant materials or shall be suitably enclosed to be weather protected.

Operating instructions shall not fade when exposed to sublight and shall be secured to prevent easy removal or peeling.

3.12 CLEANING AND ADJUSTING

- A. Equipment and piping shall be wiped clean, with all traces of oil, dust, dirt, or paint spots removed. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Pumps shall be adjusted to the flow indicated by the manufacturer to meet specified conditions.

3.13 FIELD INSTRUCTION

- A. The Contractor shall provide the services of a certified representative of the fuel storage and dispensing system and waste product transfer system for a period of three (3) working days of training for the Contracting Officer. Instruction shall include operation and maintenance.

3.14 ONE YEAR MAINTENANCE SERVICE CONTRACT

- A. Comply with all the requirements specified in SECTION 230500 – COMMON WORK RESULTS FOR PLUMBING & HVAC.

3.15 OPERATION AND MAINTENANCE MANUAL

- A. Comply with all the requirements specified in SECTION 230500 – COMMON WORK RESULTS FOR PLUMBING & HVAC.

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3.16 SCHEDULE OF MAINTENANCE SERVICE

- A. Comply with all the requirements specified in SECTION 230500 – COMMON WORK RESULTS FOR PLUMBING & HVAC.

3.17 FILLING

- A. The Contractor shall be responsible to provide the first complete filling of the fuel tank.

END OF SECTION 335613

3. Registered surveyors shall submit a letter to the Department of Public Works certifying that the monuments stakeout and installation is correct.
4. The Contractor shall verify the location of all existing utilities, whether shown on the plan or not, and shall be responsible for the repair or replacement of same in the event of damages due to his construction practices. The Contractor shall coordinate his work with the respective utility companies.

5. **The Contractor shall maintain vehicular and pedestrian access to existing facilities at all times and shall schedule and prosecute his work in such a manner as to avoid interruption of normal activities at the existing facilities. The Contractor shall provide early notification of and obtain approval for any anticipated interruptions. Contractor shall submit a construction phasing plan for approval prior to beginning construction. Temporary safe pedestrian passageways around or through a construction site shall comply with ADAAG Sections 4.1.1(4) and 4.3.**

6. The Contractor shall provide and install all traffic control devices in conformance with the current version of the "Manual of Uniform Traffic Control Devices for Streets and Highways", and to the satisfaction of the Engineer.

7. Except during actual working hours, all signs which do not pertain to the construction activity, such as "Men Working" and "Flagman Ahead" shall be covered or laid down. However all signs necessary for the safety of the public shall be maintained.

8. No construction equipment shall be parked within the road right-of-way in such a manner that the equipment will obstruct the normal movement and sight distance of the driving motorist, except during actual working hours.

9. All existing pavements, walks, utilities, and other facilities whether shown on the plans or not, which are damaged by the Contractor shall be reconstructed or replaced by the Contractor at his own expense to the original undamaged condition.

10. No trenching shall be left open for more than five (5) working days. Contractor shall properly barricade all open trenches during all phases of construction.

11. **Existing conditions are shown to the best of our knowledge. Discrepancies shall be promptly be reported to the County and be resolved before proceeding with the work.**

12. **Prior to commencement of construction, the contractor shall verify the locations of all utilities, which may be affected by his work. Interference with the structure shall promptly be reported to the County and be resolved before proceeding with the work.**

13. Should a discrepancy occur on the drawings between any project special notes/special details, and the typical specs/typical details, said special notes/special details shall take precedence.

GRADING NOTES

1. All grading work shall conform to Chapter 10 of the Hawaii County Code. Should a Grading Permit be required, no work shall commence until the Department of Public Works approves a grading permit.
2. The Contractor shall remove all silt and debris deposited in drainage facilities.

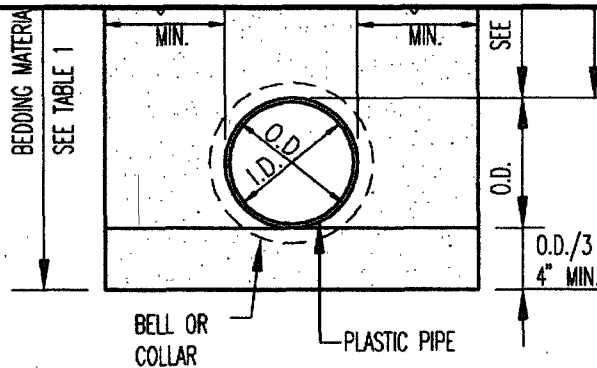
1 CHANGES TO NOTES 5, 11, AND 12

PA'AUULO SLAUGHTERHOUSE IMPROVEMENTS

REFERENCE SHEET NO. **C-1**
JOB NO. **B-4134**

ADDENDUM NO. **1**
MAY 23, 2012

SKETCH NO. **SKC-1**



NOTES:

1. THIS TRENCH SECTION APPLIES TO FLEXIBLE PIPES INCLUDING SEWER, STORM DRAIN, AND WATER PIPES. FLEXIBLE PIPE MATERIAL INCLUDES CMP, PVC, ABS, AND HDPE.
2. THIS TRENCH SECTION APPLIES TO PIPING WITHIN PRIVATE PROPERTIES ONLY.
3. BEDDING MATERIAL ABOVE PIPE SHALL BE 12" HIGH FOR GRANULAR MATERIAL AND 6" HIGH FOR CONCRETE. GRANULAR BEDDING MATERIAL SHALL BE COMPACTED TO 95% COMPACTION.
4. TRENCH BACKFILL SHALL BE 3" MINUS GRANULAR BACKFILL OR SUITABLE NATIVE MATERIAL NO LARGER THAN 6". TRENCH BACKFILL SHALL BE COMPACTED TO 95% COMPACTION.
5. TRAFFIC AREA SHALL INCLUDE BUT NOT LIMITED TO PAVED OR UNPAVED ROADWAY, SHOULDER, DRIVEWAY, CARTPATH, PARKING, LOADING ZONE, STORAGE AREA AND AREAS NOT PROTECTED FROM TRAFFIC LOAD.
NON-TRAFFIC AREA SHALL BE PROTECTED FROM TRAFFIC LOAD BY MEANS OF CONCRETE CURBS, GUARDRAILS, BARRICADE, AND AREAS INACCESSIBLE BY VEHICLES.

TABLE 1:

BEDDING MATERIAL

| DEPTH OF COVER IN FT. | TRAFFIC AREA | NON-TRAFFIC AREA |
|-----------------------|---|--|
| 6" < COVER < 12" | NOT ALLOWED | ALLOWED FOR 6" PIPE OR SMALLER ONLY WITH NO. 10 CRUSHED ROCK |
| 12" < COVER < 18" | ALLOWED FOR 6" PIPE OR SMALLER ONLY WITH CLASS "C" CONCRETE | NO. 10 CRUSHED ROCK (#4 SAND) |
| 18" < COVER < 24" | CLASS "C" CONCRETE | NO. 10 OR NO. 67 CRUSHED ROCK |
| COVER > 24" | NO. 10 OR NO. 67 CRUSHED ROCK | NO. 10 OR NO. 67 CRUSHED ROCK |

FLEXIBLE PIPE TRENCH SECTION

5

HAI



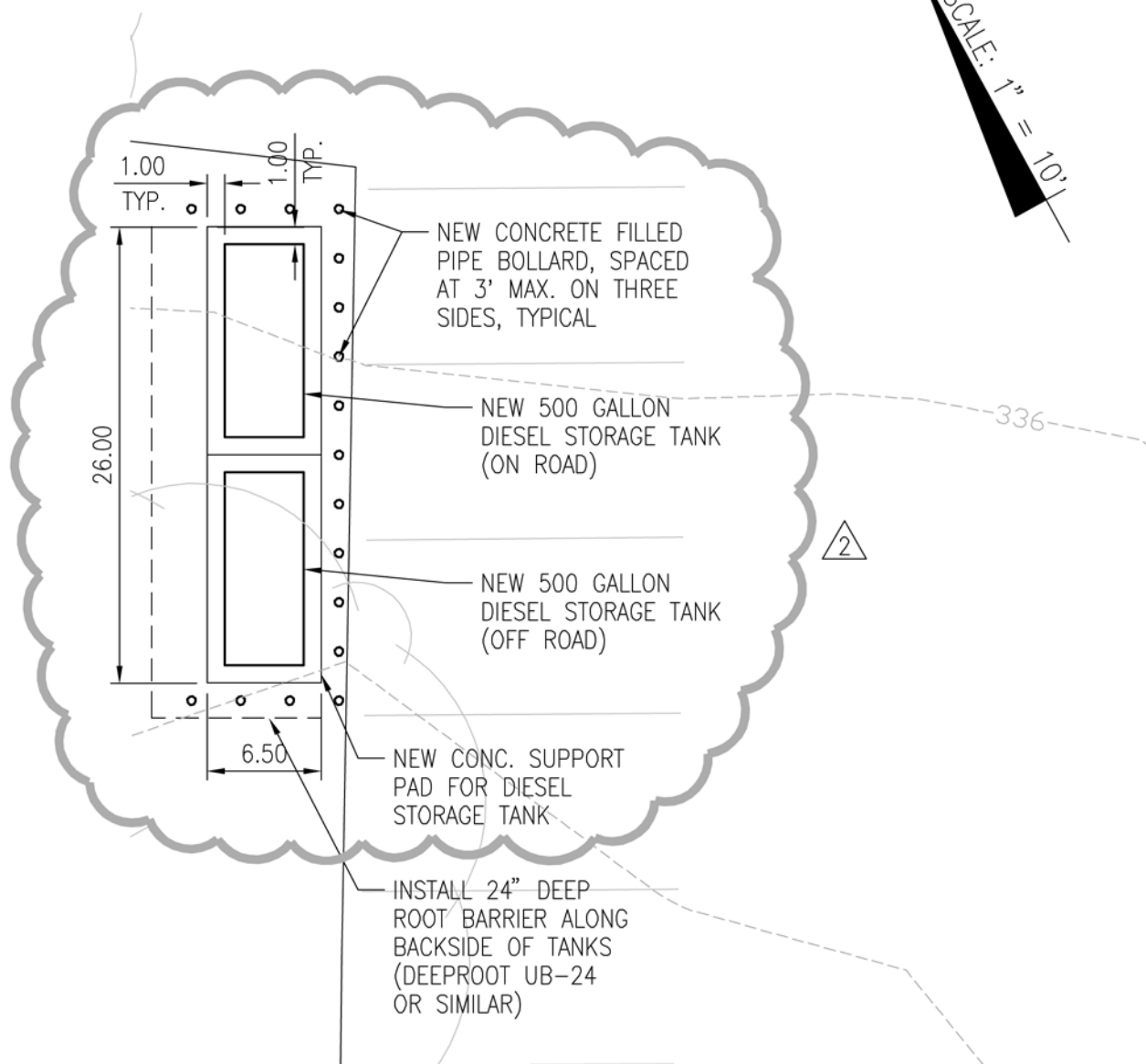
CHANGE TO DETAIL 5

**PA'AUILO SLAUGHTERHOUSE
IMPROVEMENTS**

REFERENCE SHEET NO. **C-2**
JOB NO. **B-4134**

ADDENDUM NO. **1**
MAY 23, 2012

SKETCH NO. **SKC-2**



PARTIAL SITE PLAN 1 (ADDITIVE ALTERNATE #3)

SCALE: 1" = 10'

2 CHANGE FUEL TANKS TO 500 GALLONS

PA'AUILO SLAUGHTERHOUSE IMPROVEMENTS

REFERENCE SHEET NO. C-4
JOB NO. B-4134

ADDENDUM NO. 2
MAY 23, 2012

SKETCH NO. SKC-3

AIR CURTAIN SCHEDULE

| UNIT NO. | SERVICE | CFM AT NOZZLE | NOZZLE WIDTH (IN) | ELECTRICAL | | | WEIGHT (LBS) | REMARKS |
|----------|-------------|---------------|-------------------|---------------|------------------|------------------|--------------|---|
| | | | | MOTOR V/PH/HZ | MOTOR HP x (QTY) | AMPS (PER MOTOR) | | |
| AC 1 | GARAGE/DOCK | 11890 | 132 | 480/60/3 | 1.0 X (3) | 3.2 | 334 | BERNER VSB3132AH-SS OR APPROVED EQUAL SEE NOTES 1,2,3,4,5 |
| AC 2 | GARAGE/DOCK | 11890 | 132 | 480/60/3 | 1.0 X (3) | 3.2 | 334 | BERNER VSB3132AH-SS OR APPROVED EQUAL SEE NOTES 1,2,3,4,5 |
| AC 3 | GARAGE/DOCK | 13710 | 144 | 480/60/3 | 1.0 X (3) | 3.2 | 348 | BERNER VSB3144AH-SS OR APPROVED EQUAL SEE NOTES 1,2,3,4,5 |
| AC 4 | GARAGE/DOCK | 1500 | 60 | 480/60/1 | 0.75 X (2) | 1.8 | 60 | BERNER STR1060AA-SS OR APPROVED EQUAL SEE NOTES 1,2,4,5 |
| AC 5 | GARAGE/DOCK | 1445 | 48.06 | 120/60/1 | 0.2 X (1) | 3.4 | 42 | BERNER EZN1048AA-SS OR APPROVED EQUAL SEE NOTES 1,2,5 |
| AC 6 | GARAGE/DOCK | 1095 | 42.06 | 120/60/1 | 0.2 X (1) | 3.4 | 38 | BERNER EZN1042AA-SS OR APPROVED EQUAL SEE NOTES 1,2,5 |
| AC 7 | GARAGE/DOCK | 1565 | 42 | 480/60/1 | 0.75 X (1) | 1.8 | 53 | BERNER STR1042AA-SS OR APPROVED EQUAL SEE NOTES 1,2,4,5 |

AIR CURTAIN NOTES:

1. EXTERIOR COVER HOUSING/BASE FRAME MATERIAL SHALL BE 316 STAINLESS STEEL.
2. ALL BLOWER WHEELS/HOUSINGS SHALL BE ALUMINUM.
3. MOTORS SHALL BE TOTALLY ENCLOSED AIR OVER (TEAO).
4. EACH OPENING SERVED BY AIR CURTAIN SHALL BE PROVIDED WITH REMOTE MOUNTED UL LISTED CONTROL PANEL W/ A NEMA 4X POLY/FIBERGLASS ENCLOSURE. PROVIDE BERNER PART NUMBER 903CA1HAF001, OR APPROVED EQUAL. REFER TO ELECTRICAL DRAWINGS FOR LOCATION.
5. PROVIDE FIELD MOUNTED/WIRED NEMA 4 PLUNGER STYLE DOOR SWITCH FOR EACH OPENING.

1

1

REVISION TO AIR CURTAINS

PA'AUULO SLAUGHTERHOUSE IMPROVEMENTS

REFERENCE SHEET NO. M1.0
JOB NO. B-4134

ADDENDUM NO. 2
May 23, 2012

SKETCH NO. SKM-1

FIXTURE SCHEDULE

| FIXT. TYPE | MANUFACTURER | | VOLT AMPS | MOUNTING | LAMP TYPE | REMARKS | VOLT |
|---------------|--------------|--------------------|--------------|-----------|-----------------|---|-------------|
| | NAME | CATALOG NUMBER | | | | | |
| A | LITHONIA | EPS332MVOLTGE810IS | 110 | SUSPENDED | (3) F032T8/835 | SUSPENDED 3-LAMP ENCLOSED FLUORESCENT STRIP FIXTURE | 277/ 120 |
| B | LITHONIA | VR2C50M277IRLP1 | 55 | SURFACE | (1) 50W MH | ROUGH SERVICE METAL HALIDE FIXTURE | 277 |
| C | LITHONIA | LRDOC12MEDYEL120 | 30 | SURFACE | INCL. W/FIXTURE | ROUGH SERVICE SPOT LIGHT | 120 |
| D | LITHONIA | TWH35LTBCWILP1 | 50 | WALL | (1) 35W LPS | WALL MOUNTED OUTDOOR LOW PRESSURE SODIUM | 277/ 120 |
| E | LITHONIA | C232MVOLTGE810IS | 60 | SUSPENDED | (2) F032T8/835 | SUSPENDED 2-LAMP FLUORESCENT STRIP FIXTURE | 277/ 120 |
| ⊗ | LITHONIA | LQMSW3G120/277 | 5 | UNIVERSAL | INCL. W/ FIXT. | UNIVERSAL MOUNT THERMOPLASTIC EXIT SIGN - GREEN | 277/ 120 |

1



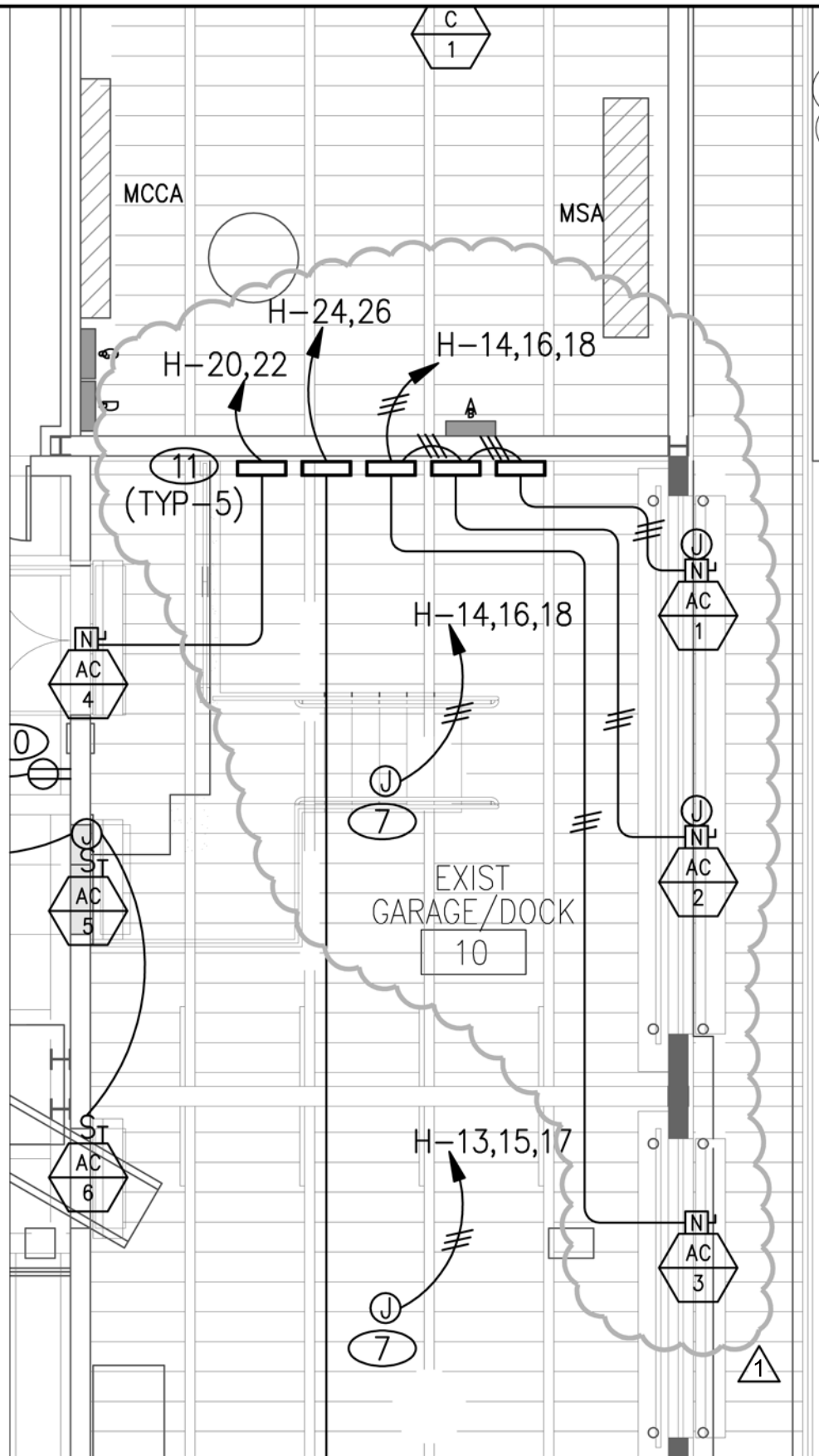
REVISION TO AIR CURTAINS

PA'AUILO SLAUGHTERHOUSE IMPROVEMENTS

REFERENCE SHEET NO. E0.0
JOB NO. B-4134

ADDENDUM NO. 2
May 23, 2012

SKETCH NO. SKE-1



11 PROVIDE CIRCUIT VIA REMOTE MOUNTED CONTROL PANEL PROVIDED BY AIR CURTAIN MANUFACTURER, REFER TO MECH. PLANS FOR ADDITIONAL DETAILS.

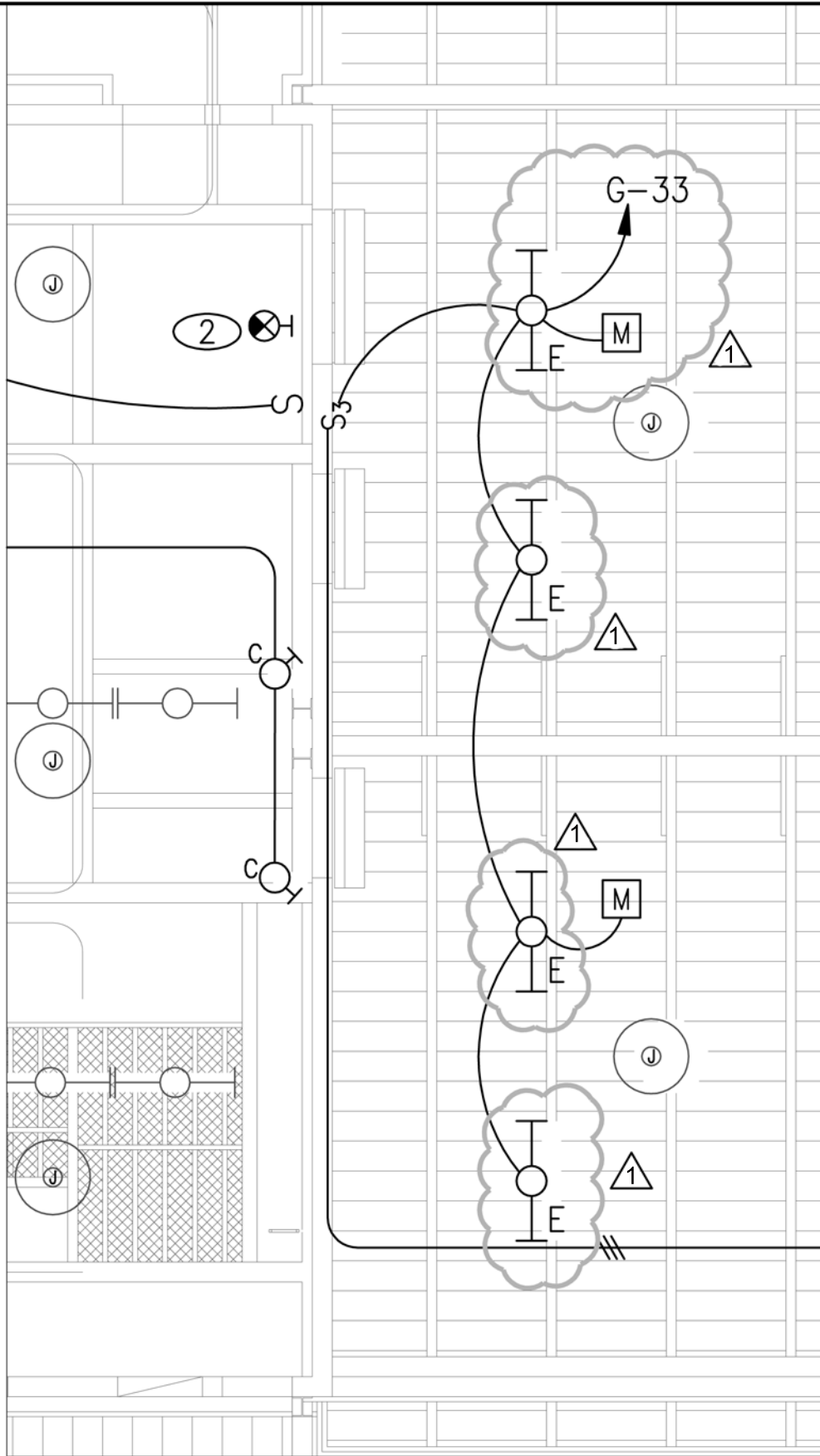
1 REVISION TO AIR CURTAINS

PA'AUILO SLAUGHTERHOUSE IMPROVEMENTS

REFERENCE SHEET NO. E3.0
JOB NO. B-4134

ADDENDUM NO. 2
May 23, 2012

SKETCH NO. SKE-2



△ REVISION TO AIR CURTAINS

PA'AUILO SLAUGHTERHOUSE IMPROVEMENTS

REFERENCE SHEET NO. E4.0
JOB NO. B-4134

ADDENDUM NO. 2
May 23, 2012

SKETCH NO. SKE-3

EXISTING

PANEL: G

DATE: 5/23/12 12:04 PM
JOB: 4043-12-001

VOLTAGE: 240 / 120 1Ø 3W
BUS: 225A
MAINS: 225A MCB
AIC RATING: 10,000

LOCATION: ELECTRICAL ROOM
MOUNTING: SURFACE

CIRCUIT CODE: blank or
N: NON-CONTINUOUS
L: LONG-CONTINUOUS
R: DEMANDABLE RECEPTACLES
K: KITCHEN

NO. OF EQUIPMENT: 0

| CMT NO | CODE | TRIP | POLE | LOAD DESIGNATION | | | | C O N N E C T E D V A | | | | | | | | LOAD DESIGNATION | | | | TRIP | POLE | CODE | CMT NO |
|--------|------|------|------|--------------------------|--------|---|---|-----------------------|------|----|---|---|----|----|---|------------------|---|--------|-------------|------|------|------|--------|
| | | | | DESCRIPTION | (NOTE) | M | R | L | ØA | ØB | A | B | ØA | ØB | L | R | M | (NOTE) | DESCRIPTION | | | | |
| 1 | | 20 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 15 | 2 | | 2 |
| 3 | | 20 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | --- | 2 | 2 | | 4 |
| 5 | | 15 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 15 | 2 | | 6 |
| 7 | | 2 | 2 | --- | | | | | - | - | * | - | - | - | | | | | --- | 2 | 2 | | 8 |
| 9 | | 15 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 10 |
| 11 | | 2 | 2 | --- | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 12 |
| 13 | | 15 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 60 | 2 | | 14 |
| 15 | | 2 | 2 | --- | | | | | - | - | * | - | - | - | | | | | --- | 2 | 2 | | 16 |
| 17 | | 15 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 18 |
| 19 | | 2 | 2 | --- | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 20 |
| 21 | | 15 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 2 | | 22 |
| 23 | | 2 | 2 | --- | | | | | - | - | * | - | - | - | | | | | --- | 2 | 2 | | 24 |
| 25 | | 20 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 26 |
| 27 | | 20 | 1 | (E) LOAD | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 28 |
| 29 | L | 20 | 1 | (N) KILL FLOOR SPOTS | 1 | | | 8 | 240 | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 30 |
| 31 | N | 20 | 1 | (N) E-4A/4B (ADD ALT #4) | 1 | 2 | | | 1920 | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 32 |
| 33 | L | 20 | 1 | (N) DOCK AREA LIGHTING | 1 | | | 4 | 240 | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 34 |
| 35 | | | | SPACE | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 36 |
| 37 | | | | SPACE | | | | | - | - | * | - | - | - | | | | | (E) LOAD | 20 | 1 | | 38 |
| 39 | | | | SPACE | | | | | - | - | * | - | - | - | | | | | SPACE | | | | 40 |
| 41 | | | | SPACE | | | | | - | - | * | - | - | - | | | | | SPACE | | | | 42 |

PANEL NOTES:

PHASE TOTALS

ØA: 480

ØB: 1920

TOTAL CONNECTED VA

2400

1. PROVIDE NEW CIRCUIT BREAKER IN EXISTING SPACE FOR NEW LOAD. MATCH EXISTING MANUFACTURER AND AIC RATING.

EXISTING LOAD (EST) = 34KVA
NEW LOAD = 2.2KVA
TOTAL LOAD = 36.2KVA

| | |
|-----------------------|------|
| CONNECTED VA (CODE N) | 1920 |
| CONNECTED VA (CODE L) | 480 |
| CONNECTED VA (CODE R) | 0 |
| CONNECTED VA (CODE K) | 0 |
| PANEL CONNECTED KVA | 2.4 |
| PANEL DEMAND KVA | 2.5 |
| PANEL DEMAND AMPS | 10.5 |
| HIGH Ø AMPS w/ DEMAND | 8.0 |

1 REVISION TO AIR CURTAINS

PA'AUILO SLAUGHTERHOUSE IMPROVEMENTS

REFERENCE SHEET NO. E6.0
JOB NO. B-4134

ADDENDUM NO. 2
May 23, 2012

SKETCH NO. SKE-4